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(54) A camera capable of recording and reproducing a photographed image.

(57) A camera (101) able to record and reproduce a photographed image includes a storage medium (110) for storing a photographed image, and a reproduction device for reproducing the photographed image. The reproduction device has a reproducing head (201) movable b tween a contraction position and a withdrawal position. Another camera has a first mode where photography is executed and a photographed image is recorded to a second mode where the recorded image is printed. Another camera has a printer device for printing a photographed image recorded on a recording medium on external reproduction paper, the printer device including an opening portion facing the external reproduction paper, and a presser member positionabl above the opening portion for pressing the external reproduc-

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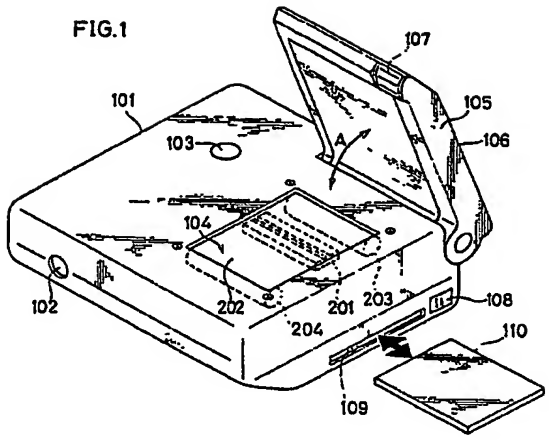
tion paper.

FIG.1



A camera capable of recording and reproducing a photographed image

BACKGROUND OF THE INVENTION AND RELATED ART STATEMENT

The present invention relates to a camera which is able to reproduce photographed images according to needs.

In recent years, there have been commercially available electronic cameras which make it possible to record a photographed image once and reproduce it on a CRT screen or by a printer.

Japanese Unexamined Patent Publication No. 61-189785, as an example of this type of electronic camera, discloses a camera with built-in printer which records photographed images once and reproduces the recorded images on printing paper internally provided therein according to needs.

In the camera with built-in printer, however, since it is necessary to provide printing paper as a recording medium inside the camera body, a printer mechanism such as a printhead, a thermal transfer film, a thermal transfer film feeder in addition to a recording device, the overall size of the camera becomes larger and the construction becomes complicated. This is contrary to recent users' needs of compact camera assuring an increased portability. Also, in the camera disclosed in Japanese Unexamined Patent Publication No. 61-189785, the camera cannot be changed or reduced in size when photographing. In other words, the printing section is not inserted in the camera body so as to reduce the size when photographing. Accordingly, poorer balance is involved in holding the camera when photographing.

There has been known an instant picture camera in which a photographed image is printed out immediately after photographing. However, since printing paper and a printer mechanism are provided in the camera body, the overall size is larger. Further, since a recording device is not provided, only a limited applicability can be available.

Japanese Unexamined Patent Publication No. 64-868 discloses an electronic camera including a semiconductor memory for recording a photographed image. Recorded images are reproduced by a separate printer. However, it will be seen in this electronic camera that photographed images cannot be reproduced in no connection with time and place when photographer wishes to reproduce the photographed image soon because the camera does not integrally carry a printer.

In such cameras executing a plurality of operations, furthermore, there have been proposed combination switch buttons in order to r duce the number of operations switch buttons. For example, there have been a switch button which serves f r both photography and erasing a recorded image, a switch button which serves for both photographing and reproducing a photographed image on TV, and a switch button which serves for both photographing and reproducing a photographed image. However, in the photographing and image erasure combination switch button, erasure operation is practiced by manually changing a mode change switch and then pressing both the combination switch button and another button at the same time. In the photographing and TV reproduction combination switch button, reproduction operation is practiced by manually changing a mode change switch and then pressing the combination switch button halfway. In the photographing and reproducing combination switch button, photography and reproduction are practiced at the same time by pressing the combination switch button. Accordingly, in conventional combination switch buttons, it will be seen that the number of operation switches are not actually reduced, operation is cumbersome. Also, there have not been disclosed a switch button which serves for both photographing button and printing button.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a camera capable of recording and reproducing a photographed image which has overcome the above-mentioned drawbacks.

According to the present invention, a camera capable of recording and reproducing a photographed image comprises storage means for storing a photographed image, and reproduction means for reproducing an photographed image stored in the storage means on external reproduction paper.

According to the present invention, also, a camera capable of recording and reproducing a photographed image comprises storage means for storing a plurality of photographed images, selection means for selecting one image from the plurality of photographed images stored on the storage means, and printer means for printing the selected image.

According to the present invention, further, a camera capable of recording and reproducing a photographed image comprises a main body, reproduction means carried by the main body, the reproduction means including a reproducing head, and being changeable from a first position where the reproducing head is placed in the main body when recording to a second position where the

reproducing head is withdrawn from the main body when reproducing and vice versa, and changer means for changing the reproduction means from the first position to the second position and vice versa.

According to the present invention, furthermore, a camera capable of recording and reproducing a photographed image, being changeable from a first mode where photography is executed and a photographed image is recorded to a second mode where the recorded image is printed and vice versa, comprises changer means including an operable member for changing the camera from first mode to the second mode and vice versa by the same operable member.

According to the present invention, moreover, a camera comprises printer means for printing a photographed image recorded on a recording medium on external reproduction paper, the printer means including, an opening portion facing the external reproduction paper, and a presser member positionable above the opening portion for pressing the external reproduction paper.

These and other objects, features and advantages of the present invention will become more apparent upon a reading of the following detailed description and drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view illustrating a first camera capable of recording and reproducing a photographed image according to the present invention;

FIG. 2A is a side view of the first camera;

FIG. 2B is a rear view of the first camera;

FIG. 3 is a system configuration diagram of the first camera;

FIG. 4 is a block diagram showing an internal circuit structure of a unit 302 shown in FIG. 3, including a CCD and an IC card;

FIG. 5 is a block diagram of a printer section; FIG. 6 is a block diagram of a circuit which reproduces recorded images on a TV screen;

FIG. 7 is a flowchart showing data processing operation executed after the image data derived from the CCD is A/D converted and written into an internal memory;

FIG. 8 is a memory map illustrating where the image data is stored in the internal memory;

FIG. 9A is a perspective view showing a construction of the printer section;

FIG. 9B is a cross sectional view of the principal parts of the printer section depicting how it prints on external paper;

FIG. 10 is a diagram showing a configuration of a thermal transfer ink film;

FIG. 11 is a block diagram showing a configuration of the printer section;

FIG. 12A is a perspective view illustrating a second camera capable of recording and reproducing a photographed image according to the present invention, a printer section of the second camera not being expanded;

FIG. 12B is a perspective view illustrating the second camera, the printer section being expanded;

FIG. 13 is a system configuration diagram of the second camera;

FIG. 14 is a block diagram showing an internal circuit structure of a unit 1302 shown in Fig. 13, including a CCD, memory and a printer section;

FIG. 15A is a diagram illustrating the printer section before put into printing;

FIG. 15B is a diagram illustrating the printer section during printing;

FIG. 16 is a block diagram of a circuit for providing a monitoring image on a display window; and

FIGS. 17A-21 are flowcharts showing operations of the first and second cameras.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS OF THE INVENTION

FIGS. 1 through 11 show a first camera according to the present invention, having a built-in printer.

Referring to FIG. 1, a camera body 101 includes a photographing section, an image data output section. The photographing section has an optical system, an image pick-up portion and an image processing portion. The image data output section has a printer, an image display portion, an auxiliary storage portion. The photographing section and the image data output section are disposed in a left side and a right side of the camera body 101 respectively. An aperture for a lens 102 with switchable focal length is provided in the front of the photographing section of the camera 101. At an appropriate position on the top of the photographing section of the camera 101 is provided a control button 103 for controlling shutter release operation on one hand and printout operation on the other hand.

At an approximate center on the top surface of the image output section is provided an opening 104 through which an image is printed out on external printing paper. Just under the opening 104 is disposed a printer section 200 (to be described later) includes a thermal printhead 201, a thermal transfer ink film 202, a supply roller 203 and a take-up roller 204 for the thermal transfer ink film 202. Further, a lid 105 swingable in the direction of an arrow A is attached to a rear portion of the

image output section of the cam ra 101 which enables a photographer to open and close the opening 104. A flat panel display window 106 which functions as both a viewfinder and a monitor (see FIG. 2B) is mounted on an outer surface of the lid 105. A flash light aperture 107 of an electronic flash unit is provided at a front edge of the lid 105. When printing an image, the lid 105 is turned down onto the camera body 101 to hold the external printing paper tight against the opening 104. On the other hand, the lid 105 is swung up and used as an electronic flash when flash photography is required. The distance between the lens 102 and the flash light aperture 107 increases when using the electronic flash. With this arrangement, the photographer can avoid the red-eye phenomenon.

Provided on a side of the image output section of the camera body 101 are a slot 109, where a removable storage medium 110 is inserted, and an eject button 108 for ejecting it. The storage medium 110 (hereinafter called the IC card) is a sort of IC card including a SRAM and a built-in backup battery. A photographed image is stored on the IC card 110 whenever required as described later.

FIG. 2A is a side view of the first camera with built-in printer and FIG. 2B is a rear view of the first camera with built-in printer.

Common part numbers are used in FIGS. 2A, 2B and FIG. 1 to identify the same parts. As already explained, the lid 105 can be swung in the direction of the arrow A, and covers the opening 104 when fully turned toward the camera body 101 as shown by the two-dot chain line in FIG. 2A. With this arrangement, the lid 105 shields the opening 104 to protect the printer section 200 when storing the camera, and squeezes the entire area of external printing paper when printing an image to prevent color misalignment. Specifically, color misalignment is prevented because of the fact that the external printing paper is pressed on a fixed position during the printing process in which the printhead is repeatedly moved every color.

As shown in FIG. 2B, a start switch 111, a print mode selection switch 112 which activates the print mode, multi-function control switches 113 and 114, an erasure switch 115, a monitor mode selection switch 116 and an indicator 117 are arranged on a rear portion of the photographing section of the camera body 101. The start switch 111 is adopted for controlling startup of the camera. The print mode selection switch 112 is used to set the camera in a print mode before printing a photographed image on external printing paper and, once the print mode is selected, the afore-mentioned control button 103 functions as a print button. The control switches 113 and 114 are multi-function switches. They are adopted for advancing and reversing stored images when reproducing r corded images. Also, they are adopted for changing the focal distance of the lens 102 from a telephoto position to a wide angle position and vice versa when photographing. The erasure switch 115 is adopted for erasing an already recorded image and the monitor mode selection switch 116 connects the camera to an external TV to monitor the image. When the monitor mode selection switch 116 is turned on, the image is monitored on the externally connected TV. When it is turned off, the image is monitored on the display window 106. The indicator 117, including a LCD, indicates the photography mode status and the frame number when photographing an image. On the other hand, the indicator 117 shows the print mode status, the frame number of the printed image and various status indications during the print process.

The display window 106, also including a LCD, functions as an electronic viewfinder which displays a subject image before photographing it in the photography mode. During the reproduction process, the display window 106 works as an image monitor on which a recorded image read out of the IC card 110 or an internal memory of the camera 101 is presented as described later.

FIG. 3 is a system configuration diagram of the first camera with built-in printer. Indicated at 301 in FIG. 3 is a system controller (hereinafter called the CPU) for controlling an overall operation of the camera including the afore-mentioned printer section 200. Indicated at 302 is a unit including a solid state image pick-up device (hereinafter called the CCD) for picking up a photographed image, and a circuit for driving the CCD, processing an image signal, recording the image signal on the IC card 110, and printing the image. A detailed description of the unit 302 will be made later. Indicated at 303 is an incident light measuring unit for measuring luminance of the subject and outputting the light measurement data to the CPU 301. Indicated at 304 is a first display unit including the display window 106 described with respect to FIG. 2B and a drive circuit for the display window 106. The unit 304 is adopted for reproducing a recorded image given from the unit 302 on the display window 106. Indicated at 305 is an electronic flash circuit including the flash light aperture 107 shown in FIG. 1, a capacitor for storing an electric charge and associated components. Upon receiving control signals from the CPU 301, the flash circuit 305 is adopted for charging electric energy into the capacitor to allow the flash light aperture 107 to glow, and outputting a signal to the CPU 301 to notify that the capacitor has been fully charged. Indicated at 306 is an exposure control unit for controlling exposure of the camera based on exposure time Tv, aperture setting value Av and other calculation results re-

ceived from the CPU 301 as well as the CCD drive timing signal derived from CCD-TG (see FIG. 4) to be described later. Indicated at 307 is a power supply unit for producing a high voltage VH of 20 V, for example, to drive the CCD and a low voltage VL of 5 V, for example, to drive other individual elements. The power supply unit 307 is adoted for supplying the high voltage VH to the CCD in accordance with a signal (P) sent from the CPU 301. Indicated at 308 is a second display unit including the indicator 117 described with reference to FIG. 2B and a drive circuit for the indicator 117.

Next, switches SM through SE are explained. SM is a main switch for starting the camera with built-in printer. The switch SM corresponds to the start switch 111 shown in FIG. 2B. SR is a start switch which functions as a photography start button when photographing a subject and a printout start button when printing an image. The switch SR corresponds to the control button 103 shown in FIG. 1. SP is a switch operable when the camera is set in the print mode for notifying that the camera comes into the printing operation. The switch SP corresponds to the print mode selection switch 112 shown in FIG. 2B. ST is a switch for setting the object lens 102 at the telephoto lens position when photographing. In other than the photographing operation, for example, image printout or reproduction, the switch ST works as an access switch to advance images in the normal order so that images recorded in the IC card 110 or internal memory of the camera 101 are reproduced sequentially on the display window 106. The switch ST corresponds to the control switch 113 shown in FIG. 2B. When the switch ST is used as a sequential frame advance switch, a succeeding frame of recorded image is reproduced each time it is turned on. SW is a switch for setting the object lens 102 at the wide-angle lens position when photographing. In other than the photographing operation, for example, image printout or reproduction, the switch SW works as an access switch to advance images in the reverse order so that images stored in the IC card 110 or internal memory of the camera 101 are reproduced sequentially on the display window 106. The switch SW corresponds to the control switch 114 shown in FIG. 2B. When the switch SW is used as a sequential frame reversing switch, a preceding frame of recorded image is reproduced each time it is turned on.

SV is a switch used when outputting an image recorded in the IC card 110 or internal memory of the camera to a TV set (not illustrated) connected externally to the camera. The switch SV corresponds to monitor mode selection switch 116 shown in FIG. 2B. An operator can monitor not only the normal size of image on the display window 106 but also an enlarged view of the photographed image on an associated TV screen by operating the switch SV. SC is a switch for detecting whether the IC card 110 is mounted in the slot 109 of the camera body. The switch SC is turned on when the IC card 110 is in the slot. SE, corresponding to the switch 115 shown in FIG. 2B, is an erasure switch for erasing an already-stored image. If the switch SE is turned on when a stored image is being printed or reproduced on a TV screen, the currently monitored image is erased from the IC card 110 or internal memory of the camera 101. Since the outputs of the switches SP, ST, SW, SV and SC are connected to the inputs of an AND circuit AN1, interrupt operations to be described later are carried out if any of these switches is turned on.

Next, FIG. 4 is a block diagram illustrating the internal circuit structure of the unit 302 shown in FIG. 3 including the CCD and IC card 110. FIG. 5 is a block diagram of the printer section. FIG. 6 is a block diagram of the circuit for reproducing a stored image on the TV screen.

As already explained, CCD 401 is a solid state image pick-up device provided with RGB stripe filters and having electronic shutter function. CCD-TG 402 delivers control signals and clock signals to individual circuits of the unit. More specifically, CCD-TG 402 generates a shutter control signal for CCD 401, a clock signal for driving an image signal readout circuit, a clock signal for CDS 403, a clock signal for an A/D converter 404 and a clock signal for an address controller 406. CDS 403 samples the output image signal of CCD 401 to perform double correlation. The A/D converter 404 converts the output image signal of CCD 401 from analog to digital data. Although an 8-bit A/D converter 404 is employed in this preferred embodiment of the invention, a desired number of bits can be selected depending on the required image quality. An internal memory 405 is an SRAM, for example, featuring a short access time. It reads serial data from CCD 401 and stores image data. The internal memory 405 is provided with a working memory area to perform image data processing in addition to an image memory area having a capacity to store at least one frame of photographed image. The internal memory 405 also stores image data obtained through a data compression process performed by the processor 407 for image processing.

The address controller 406 functions as follows. When reading image data from CCD 401, the address controller 406 outputs a serial write address signal for the internal memory 405 upon receiving a clock signal from CCD-TG 402, and then outputs an address signal to the internal memory 405 after decoding an I/O output and address signal output from the processor 407. Further, the address controller 406 reads a serial clock signal at a low speed to write the processed image data in

an external storage medium such as the IC card 110. Table ROM 408 is a memory device in which a factor to be used when applying white balance (hereinafter called WB) correction, i.e., WB correction factor, and a factor to be used when applying color conversion for the printer and TV, i.e., γ correction factor, are written in advance. These two kinds of correction will be discussed later. The processor 407 applies various kinds of digital signal processing as shown in FIG. 7 to the image data. The image data is stored in the internal memory 405 according to a format illustrated in FIG. 8, and then is rewritten in the same addresses after the R, G and B components of the image data are passed through the WB correction, γ correction, and compression processes.

WB correction refers to a process in which color temperature information received from a WB sensor 412 is converted by a conversion factor prewritten in the table ROM 408, whereas γ correction refers to a process in which the color-converted data is further converted by a conversion factor prewritten in the table ROM 408. The data compression process goes as follows. Raw image data is first compressed to 2/3 after being separated into the luminance, or Y, signal and the color difference, or C (U, V), signal. Next, the resultant signals are compressed to 1/2 after calculating differences of the Y, U and V values from their respective preceding values. After all, the whole data compression process is considered as a DYUV compression of the Compact Disc Interactive Media (hereinafter called the CD-I) system to compress the image data to 1/3. The CD-I system can allow flexible, mutual access to various kinds of digital information including not only computer data but also audio signal and still image data.

A buffer 409 is provided between the internal memory 405 and IC card 110 to temporarily store the image data output from the internal memory 405. Address controller 410 generates read and write address signals for allowing the contents of the buffer 409 to be output and written on the IC card 110.

Controlled by the CPU 301, a gate 411 performs switching of connections between the internal memory 405, and IC card 110, and the processor 407, or connects the internal memory 405 to the IC card 110. Indicated at 413 is an A/D converter for converting the analog signal derived from the WB sensor 412 into a digital signal. Indicated at 210 is a built-in battery of the IC card 110.

Now, operation of each unit is explained below in further d tail. When the start switch SR is turned on in the photography mode, the CPU 301 outputs a start signal to CCD-TG 402 while causing the light m asuring unit 303 to perform incident light measurement. The exposure control unit 306 controls exposure of the camera according to the aperture setting value Av obtained from the result of light measurement. Then, it introduces light upon CCD 401 by outputting a shutter control signal to CCD-TG 402 depending on the exposure time data Tv.

Upon completion of the above exposure process, the CPU 301 switches the address controller 406 so as to output a serial signal. The CPU 301 also outputs a read enable signal to CCD-TG 402. Consequently, the image data read into CCD 401 is transferred to the internal memory 405. When data transfer has been finished, the CPU 301 switches the address controller 406 to the processor side 407 to perform communications. The CPU 301 then outputs command signals for causing signal processing such as WB correction, γ correction as well as data compression for the image data as described in detail later with reference to FIG. 7. After these signal processing steps, the image data is stored again in the internal memory 405.

In case the IC card 110 is set ready to store the image data, the CPU 301 connects the internal memory 405 to the IC card 110 by switching the gate 411. Also, the CPU 301 causes both address controllers 406 and 410 to output address signals. As a result, the image data in the internal memory 405 is transferred to the IC card 110 via the buffer 409.

Now, the unit diagram of the printer section 200 is described below referring to FIG. 5.

An address controller 414 transfers the compressed image data obtained through individual steps of signal processing from the IC card 110 to a specified area of a processing work memory 416 according to a command received from a processor 415. What is meant by the specified area is that the data is sequentially stored in one line after another of the memory. On the other hand, the address controller 414 decodes an address signal coming from the processor 415 and delivers the resultant address signal to the work memory 416 in each step of signal processing described later. The work memory 416 is an SRAM, for example, featuring a short access time. The work memory 416 is adopted for reading the compressed data from the IC card 110, to temporarily store the data and to store the results of signal processing. Table ROM 417 stores a γ correction factor for converting TV image data into print image data, and predefined bit map data to be used for area quantization, which is explained later, to apply density correction to printout picture elements. The processor 415 demodulates or expands the compressed data recorded on the IC card 110 and converts it into a format to suit the printer. It also performs the aforementioned correction and area quantization by using the data read from the table ROM 417. More

specifically, the compressed data is expanded to generate the luminance signal (Y) and the color difference signal (C) to be described later. From these signals, the processor 415 produces complementary color signals that will match the respective ink colors of the printer. Then it performs γ correction suitable for the type of the printer in use based on the complementary color signals. Further, each color of each picture element is area-quantized by use of the bit map data stored in the table ROM 417. The resultant data is written in a line sequential access memory 418 to generate print data with a 4-dot line width. Each time the above signal processing is completed for one line of print data, the processor 415 transmits a process end signal to the CPU 301. The compressed data expansion process as used in the afore-mentioned CD-I system reproduces the original data by first calculating true color differences based on the data stored on the IC card 110 and then adding the color difference data to the immediately preceding values. When the compressed data expansion process is adapted to the ADCT system, which is described later, the original data is reproduced from the data recorded on the IC card 110 by a reversal of the conversion carried out in the compression process. γ-correction refers to a process in which image data produced for presentation on a TV screen is converted into a different form of image data suitable for the printer. Also, area quantization refers to a process in which color density of each picture element is converted into the number of dots to be printed within a 16-dot area composed of 4 dots by 4 dots. The resultant dot number data is sequentially transferred to the line sequential access memory 418. In this process, each 4x4 dot matrix segment is treated as a unit (or a picture element).

The line sequential access memory 418 stores one line of 4x4 dot data of individual picture elements and outputs one line of data (number of horizontal picture elements x 4) at a time to a printhead driver 419. The printhead driver 419, including a buffer 432 and a printhead drive circuit 433 as described later (see FIG. 11), temporarily stores the above-mentioned image data in the buffer 432, converting it into image data suitable for the printer, and outputing the resultant data to the thermal printhead 201. When heated in accordance with the image data received from the printhead driver 419, the printhead 420 transfers ink on external printing paper.

Now, operation of each unit is described below.

Print operation is started when the CPU 301 detects a print start command in the print mode. When printing an image stored on the IC card 110, the address controller 414 transfers the compressed data for the print image from the IC card 110 to a specified area of the work memory 416. On the other hand, when an image stored in th internal memory 405 is printed directly, a frame of print image (or page) in the internal memory 405 is selected by the address controller 406 and transferred into the work memory 416 via the gate 411 and processor 416. Next, the CPU 301 sends a command signal to the processor 415 requesting it to carry out signal processing for printing.

When receiving the command signal from the CPU 301, the processor 415 reads the image data from the work memory 416. The processor 415 then applies the afore-mentioned signal processing to individual ink colors in the order of Cy (cyan), Ye (yellow), Mg (magenta) and Bk (black). Upon detecting the end of processing of one line of image data, the CPU 301 executes printout of that one line by controlling the line sequential access memory 418 and thermal printhead 201. Each time printout of one line is completed, the CPU 301 carries the thermal printhead 201 one line forward to prepare for printout of the succeeding line. Printout of one frame of a single color image is accomplished in this manner. After printout of the Cy (cyan) image is completed, the Ye (yellow), Mg (magenta) and Bk (black) images are printed in this order by repeating the similar printing process. Printout of one complete image is finished in this manner.

As an alternative to the above process, the thermal printhead 201 may be advanced one line forward after printing each line with all four colors. In this alternative printing manner, one frame of image is completed by a single longitudinal scanning.

FIG. 6 is a unit diagram of a circuit for reproducing an image on a TV screen. An address controller 421 transfers the compressed image data from the IC card 110 to a specified area of an image output memory 423 according to a command received from a processor 422. What is meant by the specified area is that the data is sequentially stored in one line after another of the memory, for instance. On one hand, the address controller 421 decodes an address signal coming from the processor 422 and outputs the resultant address signal to the image output memory 423 when executing signal processing. On the other hand, the address controller 421 generates a serial read address signal and a clock signal for a D/A converter 424 while a composite video signal is being output from the image output memory 423. The image output memory 423 is an SRAM, for example, which features a short access time. The image output memory 423 is adopted for reading the compressed image data from the IC card 110, to temporarily store th processed data in the course of signal processing, and to store the resul-

tant NTSC video signal. The processor 422 performs expansion of the compressed image data and generates an NTSC composite signal by encoding the luminance signal (Y) and the color difference signal (C) through the expansion process, which is accomplished in a similar way to the afore-mentioned process. In the above encoding process, the color difference signal (C) is modulated by a subcarrier and added to the luminance signal (Y). D/A converter 424 decodes the above-mentioned NTSC composite signal to obtain an analog TV signal. 75Ω driver 425 is an impedance matching circuit by which the video output is matched with the TV input.

The following circuit description delineates the operations carried out when outputting the video signal to the TV, referring to the above unit diagrams.

When the TV reproduction mode is selected, the CPU 301 detects a change of mode and starts reproduction of image on the TV screen. When reproducing an image stored on the IC card 110 via the TV output terminal (not illustrated), the compressed image data to be output to the TV is transferred to a specified area of the image output memory 423 by the address controller 421. On the other hand, when reproducing an image stored in the internal memory 405 on the TV screen, a frame of image (or page) to be reproduced is selected from the internal memory 405 by the address controllers 406 and 421, and read into the image output memory 423 via the gate 411 and processor 422. Subsequently, the CPU 301 enables the processor 422 and address controller 421 to communicate with each other and sends a command signal to the processor 422 requesting it to perform necessary signal processing for reproduction of image on the TV screen.

Upon receiving the command signal from the CPU 301, the processor 422 reads the image data one line after another out of the image output memory 423. The processor 422 then applies the signal processing described later to the image data and writes the resultant digital NTSC signal in the image output memory 423 again. At this time, horizontal and vertical synchronizing signals are added to the image data. In case the original image consists of a field picture of half the normal horizontal line density, a pseudo-frame image processing is applied to the image data when it is written in the image output memory 423, so that it looks as if one complete frame of image is recorded in the image output memory 423. The processor 422 outputs a process end signal at the end of processing of each individual frame image. After detecting the process end signal, th CPU 301 switches the address controller 421 to the NTSC output mode. Thereupon, the image output memory 423 is set to output an NTSC composite signal and the D/A converter 424 is activated to output an analog TV signal.

Photographing, printing and output to the TV are executed in the respective modes described above.

FIG. 7 is a flowchart showing how the image signal derived from CCD 401 is A/D-converted and how the resultant data is processed after it is written in the internal memory 405.

First, WB correction is applied to the R and B signals in step #11 to bring them to the same level with the G signal. In this process, individual color signals are adjusted to the same level by using a color temperature factor determined by color temperature information derived from the afore-mentioned WB sensor 412 and A/D converter 413 when photographing a reference white image obtained by projecting light of a set color temperature. This WB correction process is executed sequentially in a horizontal direction in units of three picture elements (R, G, and B) 256 (768/3) times or one line at a time.

Next, in step #12, γ correction is made to the G signal, and the R and B signals to which WB correction has already been applied. This γ correction is also executed sequentially in a horizontal direction in units of three picture elements (R, G, and B) one line at a time.

After the above-mentioned WB and γ corrections, matrix processing is applied to the signals in step #13 by using the functions shown below, for example, to generate the low frequency band luminance signal (Y) and color difference signals (R Y and B Y) (#14):

$$Y = 0.30R + 0.59G + 0.11B$$
$$R\text{-}Y = 0.70R - 0.59G - 0.11B$$
$$B\text{-}Y = 0.89B - 0.59G - 0.30R$$

Subsequently, the low frequency band luminance signal (Y) is processed in step #15. Then, in step #16, the R, G and B signals are individually multiplied by appropriate coefficients to reduce aliasing errors, and the levels of R, G and B that make up the dot sequential signal in the high frequency band are adjusted. As in the afore-mentioned signal processing, the low frequency band (#15) and high frequency band (#16) luminance signals are also processed sequentially in a horizontal direction in units of three picture elements (R, G, and B) one line at a time.

When the above processes have been completed, pass bands of the color difference signal and luminance signal are limited as necessary in steps #17 and #18 in a sequential (or horizontal) direction one line at a time. Further, the low frequency band and high frequ ncy band luminance signals obtained in steps #15 and #16 are added in the frequency domain to generate a combined lu-

minance signal (#19). This process of luminanc signal generation is executed in a sequential (or horizontal) direction 256 times or one line at a time.

Before the image can be reproduced on a TV screen on completion of the foregoing processes, a burst signal, and horizontal and vertical synchronizing signals are added to the image signal to convert it to a standard television signal like the NTSC signal in steps #20 through #22.

FIGS. 9A and 9B illustrate cross sections of principal parts of the printer sections 200 to show the printing an image on external paper. FIG. 10 illustrates a configuration of a thermal transfer ink film 202.

As shown in FIG. 9A, the printer section 200 is located just under the opening 104 of the camera body 101. As shown in FIG. 9B, the printer section 200 is arranged in such a manner that the thermal transfer ink film 202 is supplied in the direction of an arrow B from a supply roller 203 to a take-up roller 204 and a color detecting sensor 205 can detect the current print color. The thermal printhead 201 prints an image by writing the right color in the right position by the heat transfer process through the thermal transfer ink film 202 as it scans across external paper G placed upon the opening 104 in the direction of an arrow C according to the image data. This scanning process is performed for each of the afore-mentioned four colors. A complete printout of a photographed image is obtained by repeating the scanning process four times to superimpose four discrete color images.

As shown in FIG. 10, cyan, yellow, magenta and black ink areas, for example, are arranged in order on the surface of the thermal transfer ink film 202 at regular intervals of which width is equivalent to or greater than that of the print area. With this arrangement, individual color images are printed with the respective color signals output from the line sequential access memory 418 to the thermal printhead 201.

When printing an image, the operator turns the lid 105 toward the camera body 101 as shown in FIG. 9B and presses the control button 103 while holding down the external printing paper G placed upon the opening 104. When the control button 103, or switch SR, is turned on, the printer section 200 starts the above-mentioned printing sequence and an image is printed out on the external printing paper G. Squeezed evenly by the lid 105 over the entire area, the external printing paper G will not be displaced by the printing action of the printer section 200 enabling printout free from color misalignment problems. Further, since the thermal printhead 201 is pressed against the external printing paper at an appropriate steady pressure by the above-mentioned lid 105, colors are heat-transferred at a constant density resulting in beautiful outputs.

FIG. 11 is a block diagram showing the configuration and operation of the printer section.

Overall operation of this section is controlled by the CPU 301. Indicated at 431 is a print data generating section including the afore-mentioned processor 415, line sequential access memory 418. As already described, a buffer 432 converts parallel data of the bit number of one line supplied from the line sequential access memory 418 into serial data and outputs it to the printhead drive circuit 433. Using the output of the buffer 432, the printhead drive circuit 433 heats and drives the thermal printhead 201.

A mechanism control circuit 434 controls individual mechanical elements of the printer section 200 shown in FIG. 9A based on the commands from the CPU 301 and connected to a printhead driving pulse motor 435 which drives the thermal printhead 201 in its scanning direction, a thermal transfer film take-up motor 436 which drives the take-up roller 204 of the thermal transfer film 202, and the color detecting sensor 205.

Operation of individual circuits is described below referring to the above unit diagram description.

Upon detecting that the camera is set to the print mode, the CPU 301 transmits a print command signal to the printhead drive circuit 433. In accordance with the print command signal from the CPU 301, the printhead drive circuit 433 produces a heating signal to be applied to the thermal printhead 201 by using one line of dot data received from the buffer 432 so that a cyan image of the first line is printed. Then the thermal printhead 201 is carried one line forward by the printhead driving pulse motor 435. Printout of a complete image of the first color, or cyan, is accomplished by alternately printing a line of cyan and advancing the thermal printhead 201. Thereupon, the CPU 301 activates the printhead driving pulse motor 435 to bring the thermal printhead 201 back to the reference position, or the first line, and causes the thermal transfer film take-up motor 436 to take up the thermal transfer ink film 202 by the length of one color area to set to yellow. Printout of a complete yellow image is accomplished by alternately printing a line of yellow and advancing the thermal printhead 201 in the same way as above. A similar process is performed for magenta and black to reproduce a complete image by combination of colors. As already-mentioned, it is also possible to sequentially print cyan, yellow, magenta and black one line after another.

FIGS. 12A, 12B show a second camera of the present invention, having a built-in printer.

FIG. 12A is a perspective view of the second camera showing a printer section of the second camera is not expanded, FIG. 12B is another per-

spective view of the second camera showing the printer section is expanded.

Common part numbers are used in FIGS. 12A and 12B to identify the same parts.

Provided on front of the camera body 1101 are an object lens 1102 with switchable focal distance, a flash aperture 1107 and a viewfinder lens 1109. At an approximate position on a top of the camera body 1101 is provided a display window 1106 including a LCD. When photographing a subject with the camera, the display window 1106 indicates the photography mode status, the frame number, a warning against saturation of the internal memory capacity of the camera, etc. On the other hand, the display window 1106 shows the print mode status, the frame number of the printed image, print in process and print complete status indications as well as the image reproduced from the internal memory of the camera during the print process.

Also, provided on the top of the camera body 1101 are a dual-function start button 1103 which works as a photographing start button when photographing an image and as a printout start button when printing an image, an ON/OFF switch 1111 adopted for turning on and off the camera, switches 1113 and 1114 adopted for setting the object lens 1102 to the telephoto and wide-angle focal positions respectively when photographing a subject, an erasure switch 1115 adopted for erasing an image stored in the internal memory, and a TV output on/off switch 1116.

A TV output terminal 1110 is provided on a side of the camera body 1101.

The switches 1113 and 1114 are also adopted for sequentially advancing the frame in the normal and reverse orders respectively when printing or reproducing recorded images on the TV screen.

A movable member 1101a is provided on a side of the camera body 1101 for accomodating a built-in printer, which is withdrawn in the direction of an arrow when printing.

Referring to FIG. 12B, a thermal printhead (shown at 1201 in FIGS. 15A and 15B), a thermal transfer ink film 1202 and a printing frame 1206 (hatched part), or an opening located at an appropriate lower position facing external printing paper, come into view when the movable member 1101a is drawn out. If the printout start button 1103 is pressed in this state, the thermal printhead 1201 starts to scan while moving in the arrow direction. Thus, the desired image is printed on paper placed just beneath the printing frame 1206. The thermal transfer ink film 1202 is supplied from a supply roller 1203 toward a tak -up roller 1204. The thermal transfer ink film 1202 has a sufficient width to cover the printing frame 1206. The thermal printhead 1201 used in the second camera is of a one-dimensional type, of which longer axis is parallel with the side of the printing frame 1206 (or perpendicular to the arrow direction shown).

To indicate the printing position to the operator, paper positioning lines 1207 are marked on the rear and right sides of the movable member 1101a. The paper positioning lines 1207 are marked on the rear and right sides of the movable member 1101a at exact positions where the edges of the printing frame 1206 in both the longitudinal and lateral directions are projected. Such paper positioning marks are not necessarily required to indicate the edges of the printing frame 1206 but may indicate the centers of its sides or the whole printing area.

FIG. 13 is a block diagram of the second camera.

Referring to FIG. 13, a system controller 1301 (hereinafter called the CPU) through a power supply unit 1307 correspond to the system controller 301 through power the supply unit 307 shown in the first camera respectively, and they perform the same operations in principle. Indicated at 1302 is a unit comprising a solid state image pick-up device (hereinafter called the CCD) into which a photographed image is stored and associated circuits which drive the CCD and perform processing of input image, recording of image data into an internal memory and printing operation.

Switches SM through SE perform the same operations as switches SM through SE (with the only exception of a switch SC) described in the first camera.

Namely, the switch 1103 corresponds to a switch SR, the switch 1111 corresponds to switch SM, the switch 1113 corresponds to a switch ST, the switch 1114 corresponds to a switch SW, the switch 1115 corresponds to a switch SE, and the switch 1116 corresponds to a switch SV. Also, a switch SP is activated when the movable member 1101a is withdrawn from the camera body. The second camera is not provided with the switch SC of the first camera because the second camera is not mountable with an IC card.

The start switch SR and switches ST and SW are changed by the CPU 1301 in accordance with the positions of the movable member 1101a. The positions of the movable member 1101a are detected based on outputs of the switch SP. Since the outputs of the switches SP, ST, SW and SV are connected to the inputs of an AND circuit AN1, interrupt (INT) operations to be described later are carried out if any of these switches is turned on.

Next, FIG. 14 is a unit diagram of the CCD, memory and printer section. FIG. 14 corr sponds to FIGS. 4 through 6 of the first camera.

Referring to FIG. 14, CCD 1401 through table ROM 1408, WB sensor 1412 and A/D converter 1413 correspond to the CCD 401 through table

ROM 408, WB sensor 412 and A/D converter 413 of the first camera respectively. Also, line sequential access memory 1418, buffer 1419, printhead 1201, address controller 1421, image output memory 1423 and D/A converter 1424 correspond to the line sequential access memory 418, buffer 419, printhead 201, address controller 421, image output memory 423 and D/A converter 424 of the first camera respectively.

Now, photographing, printout and TV output operations are described below.

(1) Photographing operation

When the start switch SR is turned on in the photography mode, the CPU 1301 outputs a start signal to CCD-TG 1402 while causing the light measuring unit 1303 to perform incident light measurement. The exposure control unit 1306 controls exposure of the camera according to the aperture setting value Av obtained from the result of light measurement. Then, it introduces light upon CCD 1401 by outputting a shutter control signal to CCD-TG 1402 depending on the exposure time data Tv.

Upon completion of the above exposure process, the CPU 1301 switches the address controller 1406 so as to output a serial signal. The CPU 1301 also outputs a read enable signal to CCD-TG 1402. Consequently, the image data read into CCD 1401 is transferred to the internal memory 1405. When data transfer has been finished, the CPU 1301 switches the address controller 1406 to the processor side 1407 to perform communications. The CPU 1301 then outputs command signals to apply signal processing to the image data, as described in detail later with reference to a flowchart of FIG. 17. The processed image data is stored again in the internal memory 1405.

One photographing cycle is completed by the above procedure. Thereupon, the CPU 1301 requests the address controller 1406 to switch the write address of the internal memory 1405 to the next frame and waits for the start of the succeeding photographing cycle.

(2) Printout operation

The CPU 1301 start printout operation upon detecting a print start command signal in the print mode.

First, the CPU 1301 causes the address controller 1406 to select a page in the internal memory 1405 where the image to be printed is stored, and sends a command signal to the processor 1407 requesting it to carry out signal processing for printing.

Upon receiving a command signal from the CPU 1301, the processor 1407 performs γ correction at first, and then reads the image data out of the internal memory 1405. Subsequently, the processor 1407 performs the afore-mentioned area quantization to individual ink colors in the order of Cy (cyan), Ye (yellow), Mg (magenta) and Bk (black). In this signal processing, image data of cyan is generated at first. Then, it is area quantized by use of the data programmed in the table ROM 1408, and the resultant data is written in the line sequential access memory 1418. Each time the above signal processing is completed for one line of print data, the processor 1407 transmits a process end signal to the CPU 1301. Upon detecting the end of processing of one line of image data, the CPU 1301 executes printout of that one line by controlling the buffer 1419 and thermal printhead 1201. Each time printout of one line is completed, the CPU 1301 carries the thermal printhead 1201 one line forward in the direction of an arrow shown in FIG. 12B to prepare for printout of the succeeding line. Printout of one frame of a single color image is accomplished in this manner. After printout of the Cy (cyan) image is completed, the Ye (yellow), Mg (magenta) and Bk (black) images are printed in this order by repeating the similar printing process. Printout of one complete image is finished in this manner.

As an alternative to the above process, the thermal printhead 1201 may be advanced one line forward after printing each line with all four colors. In this alternative printing manner, one frame of image is completed by a single longitudinal scanning.

(3) TV output operation

When the TV reproduction mode is selected, the CPU 1301 detects a change of mode and starts reproduction of image on the TV screen. The CPU 1301 causes the address controller 1406 to select a frame in the internal memory 1405 where the image to be reproduced on the TV is stored. On the other hand, the CPU 1301 enables the processor 1407 and address controller 1421 to communicate with each other and sends a command signal to the processor 1407 requesting it to perform necessary signal processing for reproduction of image on the TV screen.

Upon receiving the command signal from the CPU 1301, the processor 1407 reads the image data one line after another out of the internal memory 1405. The processor 1407 then applies the signal processing described later to the image data and writes the resultant NTSC signal in the image output memory 1423. At this tim , horizontal and

vertical synchronizing signals are added to the image data. In case the original image consists of a field picture of half the normal horizontal line density, a pseudo-frame image processing is applied to the image data when it is written in the image output memory 1423, so that it looks as if one complete frame of image is recorded in the image output memory 1423. The processor 1407 outputs a process end signal at the end of processing of each individual frame image. After detecting the process end signal, the CPU 1301 switches the address controller 1421 to the NTSC output mode. Thereupon, the image output memory 1423 is set to output an NTSC signal and the D/A converter 1424 is activated to output an analog TV signal.

Photographing, printing and output to the TV are executed in the respective modes described above.

FIGS. 15A and 15B illustrate cross sections of principal parts of the printer section to show operation of the thermal printhead.

Referring to FIGS. 15A and 15B, indicated at 1201 is the thermal printhead, indicated at 1202 is the afore-mentioned thermal transfer film, indicated at 1203 is the supply roller of the thermal transfer ink film 1202, and indicated at 1204 is the take-up roller of the thermal transfer ink film 1202. As an example, cyan, yellow, magenta and black ink areas are arranged in order on the surface of the above-mentioned thermal transfer ink film 1202 at regular intervals as shown in FIG. 10. The recurring interval of different ink areas is made equal to or longer than the length of the print area. Indicated at 1205 is a color detecting sensor for discriminating the ink color just under the thermal printhead 1201. With this color discrimination system, individual color images are printed with the respective color signals output from the line sequential access memory 1418 to the thermal printhead 1201.

FIG. 15A shows a state in which the print mechanism is started for printing, in other words, an image is being photographed. The take-up roller 1204 and take-up drive mechanism (not shown in the drawing) are incorporated in the camera body but other than in the movable member 1101a shown in FIG. 12B. On the other hand, the supply roller 1203, thermal printhead 1201, color detecting sensor 1205 and the associated drive mechanism are built in the movable member 1101a as shown in FIG. 12B.

Next, FIG. 15B shows a state in which the movable member 1101a is withdrawn from the camera body. Print operation is performed by scanning the thermal printhead 1201 while it is kept in contact with the thermal transfer ink film 1202. The supply roller 1203 still remains inside the movable member 1101a in this state whereas the thermal printhead 1201 scans the printing frame 1206 while moving in the arrow direction. A complete printout of a photographed image is obtained by repeating the scanning four times to superimpose four discrete color images.

A block diagram is omitted for this printer section because it is identical with the unit diagram shown in FIG. 11 and their operation is also the same.

The thermal printhead 1201 is not limited to a linear one-dimensional shape, but may be a point-shaped one. In the latter case, the mechanism control circuit 434 is designed in such a manner that it can control the printhead driving pulse motor 435 to drive the printhead in both the line and column directions throughout the effective print area to accomplish printing of one complete image. As an alternative to the above process, the printhead may be advanced one line forward after printing each line with all four colors. In this alternative printing manner, one frame of image is completed by a single longitudinal scanning.

FIG. 16 is a block diagram of a circuit for providing a monitor image on the display window 1106. This block diagram corresponds to the block diagram of FIG. 6. Blocks identical to those shown in FIG. 14 carry the same reference numerals as those of FIG. 16.

Character data output memory 1427 is a RAM, for example, in which various kinds of character data sent from the CPU 1301 such as frame number, print in process or print complete status to be shown on the display window 1106 together with an image are written. A character generator may be used as a substitute for RAM to output appropriate character data according to command signals received from the CPU 1301.

The purpose of video mixer 1428 is to generate a frame of image by combining the image data output and character data output together. Provided with a display window 1106 as integral part, a display unit 1429 is an LCD TV monitor, for example, which monitors the input signal from D/A converter 1424. Drive circuit 1430 scans the screen of the display window 1106 while applying a voltage to individual elements of the LCD.

Since the display window 1106 monitors an image when it is printed or reproduced on a TV screen, a stored image is presented on the display window 1106 each time the access switch ST or SW is turned on after the print mode detect switch SP or TV output switch SV is turned on.

Before a specific image is reproduced, image data processed to be output to the TV is first stored in the image output memory 1423. This image data comes from a memory area of a specific frame number in the internal memory 1405, whichever selected by the access switch ST or SW.

On the other hand, on-screen alphanumeric data such as frame number, print in process or print complete status information received from the CPU 1301 is processed in the processor 1407 and stored in the character data output memory 1427. Then, the alphanumeric data output from the character data output memory 1427 and the image data output from the image output memory 1423 are combined into a single picture in the video mixer 1428. As a result, each image is displayed with its frame number. The mixed image data is delivered through the D/A converter 1424 to the display unit 1429 for on-screen presentation. When the start switch SR is turned on after the image is presented on the display window 1106 as explained above, the same image is printed through the afore-mentioned procedure.

Now, operations of the first and second cameras will be described in accordance with flowcharts shown in FIGS. 17A through 21.

It will be noted that components mentioned in the following descriptions refer not only to the components of the first camera but also to the components of the second camera although the later-mentioned components carry reference numerals of the first camera.

Operation of the camera is controlled by the CPU 301 and a program stored in a ROM (not illustrated) connected to the CPU 301.

A START routine shown in FIGS. 17A and 17B is executed when a power supply is mounted to the camera body 101.

More specifically, it is checked whether the main switch SM is turned on at first (#100). If the main switch SM is in the OFF-state (No in Step #100), this routine proceeds to Step #101 and prohibits any interrupt operation, and then resets the flag in Step #102. If any image or message is displayed on the display window 106 and indicator 117, the indications are cleared (#103), and this routine returns to Step #100 and waits until the main switch SM is turned on. When the main switch SM is turned on (Yes in Step #100), or if it has already been in the ON-state when the power supply is mounted, an interrupt operation is allowed (#104) and this routine proceeds to Step #105.

In Step #105, it is checked whether the start switch SR is turned on. If the start switch SR is not turned on (No in Step #105), this routine returns to Step #100, and repeats Steps #100 through #104. If, however, the start switch SR is turned on (Yes in Step #105), CCD 401 is powered on (#106). In short, the power supply unit 307 provides a high voltage VH to the CCD upon receiving a signal (P) sent from the CPU 301. As soon as the power is supplied, a command signal is output to CCD-TG 402 to initialize CCD 401 so as to remov residual charges in CCD 401 (#107). Next, the light measuring unit 303 measures incident light in order to calculate exposure time Tv and aperture setting value Av (#108). Also, the subject is checked to see if it is a low luminance object or not (#109) based on the light measurement data. In case the subject is judged to be a low luminance object (Yes in Step #109), flash glow timing is calculated from the light measurement data (#111) in order to use the electronic flash when photographing. Next, it is checked whether a charging capacitor in the flash circuit 305 is charged with sufficient electric energy. If it is not fully charged (No in Step #112), an uncharged flag is set to "1" to start charging (#113, #114). this routine proceeds to Step #115 upon completion of charging (Yes in Step #112). Charging is stopped when it has been verified that the capacitor has been fully charged in Step #115, and in Step #116, it is checked whether the uncharged flag is set to "1". If the uncharged flag has already been set to "1" (Yes in Step 116), it is se to "0" in Step #117 and this routine is kept in standby until the start switch SR is turned off (#118). When the start switch SR is turned off (Yes in Step #118), this routine returns to Step #100 and the so-called release lock is carried out. On the other hand, if the uncharged flag is in "0" in Step #116, this routine proceeds to Step #119 and a sub-routine titled "Exposure control 2" shown in FIGS 20A and 20B is executed.

Now, referring to FIGS 20A and 20B, any interrupt operation is prohibited in Step #401 at first, and exposure time Tv and aperture setting value Av calculated from the above-mentioned light measurement data are output to the exposure control unit 306 (#402). Based on these data, the exposure control unit 306 drives the diaphragm of the camera 101 and exposes CCD 401 by outputting a shutter control signal to CCD-TG 402 according to exposure time Tv. When a signal indicating the start of release (start of exposure) has been received from the exposure control unit 306 (#403), its internal timer is started (#404) according to the flash glow timing obtained in Step #111. The electronic flash is designed to glow after a certain time has elapsed from the start of exposure of CCD 401. Next, it is checked whether a release end signal has been received from the exposure control unit 306 (#405). This judgment is made because the above-mentioned exposure time Tv is just an estimated value. If the luminance of the subject suddenly increases while the flash glow timer is counting down, the exposure control unit 306 may output a release end signal even though the flash glow timing has not been reached. Accordingly, the purpose of the above process is to terminate the exposure operation without causing the electronic flash to glow in case the exposure control unit 306

has output a release end signal before the flash glow timing is reached (No in Step #406 and Yes in Step #405). In contrast, if the flash glow timing is reached before the release operation is completed (Yes in Step #406), the electronic flash is caused to glow and a release end signal is output to the exposure control unit 306 (#407, #408) to terminate the exposure operation.

When the above exposure process has been completed, it is checked whether a card flag is set to "1" in Step #409. If the value is "1" (Yes in Step #409), the image signal read into CCD 401 is written on the IC card 110 mounted on the camera (#411). If the flag is "0", the image signal read into CCD 401 is written into the internal memory 405 of the camera 101 (#410).

It will be noted that in the second camera, this routine skips directly from Step #408 to Step #410 since the second camera is not provided with an IC card. When the storage capacity of the internal memory 405 is saturated (Yes in Step #416), a visual or an audible warning is generated (#417).

It is checked whether the storage capacity of the IC card 110 is saturated after the image signal has been written on the IC card 110. If it is saturated (Yes in #412), the card flag is set to "0" in Step #413 while a warning is produced in Step #414. Address of the internal memory 405 can be linked to that of the IC card 110 so that the photographer is alerted of saturation of the IC card 110 and the photographed image signal overflowing thereafter is written in the internal memory 405 instead of the IC card 110. On completing the above processes, this sub-routine returns to the main routine after enabling an interrupt operation in Step #415.

If the subject is judged not to be a low luminance object (No in Step #109), a sub-routine shown in FIGS. 19A and 19B, in which the electronic flash does not glow, is executed (#110).

Referring to FIGS. 19A and 19B, any interrupt operation is prohibited in Step #301 at first, and exposure time Tv and aperture setting value Av calculated from the afore-mentioned light measurement data are output to the exposure control unit 306 (#302). Based on these data, the exposure control unit 306 drives the diaphragm of the camera 101 and exposes CCD 401 by outputting a shutter control signal to CCD-TG 402 according to exposure time Tv. When a signal indicating the start of release (start of exposure) has been received from the exposure control unit 306 (#303), a timer is started to count a blurring limit time (#304). The blurring limit time, which defines the maximum exposure time within which photographing can be properly made without blurring, is counted in case a relatively long exposure time is required. After starting the timer, it is checked whether a release end signal is output from the exposure control unit 306 (#305) while the timer is counted down as in the case of flash assisted exposure explained earlier. If exposure time Tv is reached (No in Step #306) before the blurring limit time elapses, the exposure control unit 306 outputs a release end signal (Yes in Step #305) to terminate the exposure operation. On the other hand, if the timer completes countdown before the release operation is finished (Yes in Step #306), it is determined that the blurring limit time has been reached and a forced shutter close signal is output to the exposure control unit 306 (#307) to terminate the exposure operation.

When the above exposure process is completed, it is checked whether a card flag is set to "1" in Step #308 in the same manner as Steps #409 through #417 in the "Exposure Control 2" sub-routine. If the card flang is set to "1" (Yes in Step #308), the image signal stored in CCD 401 is written on the IC card 110 mounted on the camera (#310). If the card flag is set to "0", the image signal stored in CCD 401 is written into the internal memory 405 of the camera 101 (#309).

It will be noted that in the second camera, this sub-routine skips directly from Step #307 to Step #309 since the second camera is not provided with an IC card. When the storage capacity of the internal memory 405 is saturated (Yes in Step #315), a visual or an audible warning is generated (#316).

It is checked whether the storage capacity of the IC card 110 is saturated after the image signal is written on the IC card 110. If it is saturated (Yes in #311), the card flag is set to "0" in Step #312 while a warning is produced in Step #313. On completing the above processes, this sub-routine returns to the main routine after enabling an interrupt operation in Step #314.

Now, referring again to the flowchart in FIGS. 17A, 17B, and 17C, upon completing the exposure control sub-routine of Step #110 or #119, the routine proceeds to Step #120 where the frame number is incremented by one and displayed on the indicator 117. It will be noted that in the second camera, various status indications are displayed on the display window 106 together with the image. When photographing of all the frames is finished and the storage capacities of the IC card 110 and internal memory 405 are saturated (Yes in Step #121), the photographer is alerted with a visual or an audible warning in Step #122. If images can still be stored, warning is not be generated.

Then, the routine proceeds to Step #123 and waits until the start switch SR is turned off. When the start switch SR is in OFF-state (Yes in Step #123), CPU 301 outputs a signal (P) to turn off the pow r supply to CCD 401 and finish photographing

of one frame (#124). After the above Steps, it is checked whether the electronic flash is already charged with sufficient electric energy to perform subsequent photographing (#125). If it is not fully charged (No in Step #125), an uncharged flag is set to "1" and charging is started to complete charging (#126, #127). When charging is completed (Yes in Step #125), the uncharged flag is set to "0" to stop charging (#128, #129). Thereupon, the routine returns to Step #100 and repeats the same sequence as Steps #100 through #129 explained above.

Referring to the flowcharts of FIGS. 18A through 18D, interrupt opeations after Step #104 will be described.

An interrupt operation is executed when any of the following switches is turned on; the switch SC for detecting existence/inexistence of the IC card 110 (except for the second camera), the switch SP for detecting a transfer to the print mode, the switch SV for requesting reproduction of image on a TV screen, and the access switches ST and SW.

When an interrupt operation is executed, it is checked whether the uncharged flag has already been set to "1" in Step #201. If the value is "1", it is determined that an interrupt operation is commanded during the time that the capacitor is being charged. If the flag is "0", this interrupt routine skips Step #202 and it is checked whether the switch SC is in ON-state in Step #203. If the switch SC is still in OFF-state (No in Step #203), the card flag is set to "0" and it is determined that the IC card 110 is not mounted on the camera and an indication that the IC card is not mounted is displayed (#205, #206).

On the other hand, if the switch SC is in ON-state (Yes in Step #203), an IC card installation sub-routine is executed in Step #204. It will be noted that the second camera does not require Steps #203 through #206.

FIG. 21 is a flowchart showing the IC card installation sub-routine.

In Step #501 of this sub-routine, a memory map showing the status of image data storage in the IC card 110 is read out to check whether the storage capacity is already saturated, or whether an excess memory area is available to store more image data. If there is an area to store additional image data (No in Step #502), the card flag is set to "1" and an IC card existence indication is displayed (#503, #504). If the memory capacity of the IC card 110 is already saturated (Yes in Step #502), the card flag is set to "0" and a warning is given to the photographer (#505, #506). Subsequently, this sub-routine returns to the main routine.

Now, returning to FIGS. 18A through 18D, it is ch cked whether the switch SP is turned on. When the switch SP is in ON-state (Yes in Step #207), it is determined that the camera is set in the print mode and this routine proceeds to Step #208. If the switch SP is still in OFF-state (No in Step #207), this routine proceeds to Step #229. In Step #208, an indication that the camera is in the print mode is displayed and it is checked whether the access switch ST is turned on (#209). This routine proceeds to Step #210 when the access switch ST is in ON-state (Yes in Step #209), this routine proceeds to Step #215. When the access switch ST is kept its state or is turned off (No in Step #209), this routine proceeds to Step #215.

In Step #210, it is determined that the access switch ST is pressed and the frame number is incremented by one and is presented on the indicator 117. On the other hand, the address controller 421 outputs the address data corresponding to the updated frame number in order to reproduce the image of the relevant frame number (#211). Waiting for a moment in Step #212 while the above operations are carried out, the display window 106 is operated to monitor the image information corresponding to the current frame number (#213). Then, this routine returns to Step #209, the frame number is incremented each time the access switch ST is pressed, and the corresponding image is presented on the display window 106. This routine repeats these steps each time the access switch ST is pressed. On the other hand, it is checked whether the access switch ST is in ON-state in Step #215. This routine returns to Step #209 when the access switch ST is in ON-state (Yes in Step #215). This routine proceeds to Step #216 when the access switch ST is in OFF-state (No in Step #215).

Next, this routine proceeds to Step #217 when the access switch SW is turned on (Yes in Step #216) instead of the access switch ST. When the access switch SW is kept its state or turned off (No in Step #216), this routine proceeds to Step #222.

In Step #217, it is determined that the access switch SW is pressed, the frame number is decremented by one and is presented on the indicator 117 . On the other hand, the address controller 421 outputs the address data corresponding to the updated frame number in order to reproduce an image of the relevant frame number (#218). Waiting for a moment in Step #219 while the above operations are carried out, the display window 106 is operated to monitor the image information corresponding to the current frame number (#220). Then, this routine returns to Step #216, the frame number is decremented by one when the access switch SW is pressed and the corresponding image is presented on the display window 106. This routine repeats these steps each time the access switch SW is pressed. On the other hand, in Step

#222, it is checked whether the access switch SW is in ON-state. When the access switch SW is in ON-state, this routine returns to Step # 216. When the access switch SW is in OFF-state (No in Step #222), this routine proceeds to Step #250.

In Step #250, it is checked whether the erasure switch SE is turned on. When the erasure switch SE is turned on (Yes in Step #250), the image currently monitored on the display window 106 is erased from the IC card 110 or internal memory 405 (#251). Then, this routine returns to Step #203. If, however, the erasure switch SE is not turned on (No in Step #250), this routine proceeds to Step #223 and it is checked whether the start switch SR is turned on.

If the start switch SR is not turned on (No in Step #223), it is determined that printout is not required, this routine returns to Step #203 and repeats the above steps. On the contrary, if the start switch SR is turned on (Yes in Step #223), a print command signal is output to the processor in the unit 302 (#224) to start printout operation. On receiving this signal, the processor causes the printer section to start printing. An indication that printout operation is being executed is presented on the indicator 117 while the printout operation is executed (#225, #226). Subsequently, this routine waits until the printout operation is completed in Step #227 and a print end indicator is lit (#228) when a print end signal is output (Yes in Step #227). After printing one frame of image through the above processes, this routine returns to Step #203.

On the other hand, if the switch SP is not turned on in Step #207, it is determined that printout is not required and this routine proceeds to Step #229. In Step #229, it is checked whether the switch SV for reproduction on the TV is in ON-state. If the switch SV for reproduction on the TV is not in ON-state (No in Step #229), it is determined that reproduction of image on the TV screen is not required and this routine proceeds to Step #241. On the contrary, if the switch SV for reproduction on the TV is in ON-state (Yes in Step #229), this routine proceeds to Step #231 via Step #230.

In this reproduction mode, it is checked whether the access switch ST or SW is pressed (#231, #236). When the access switch ST is in ON-state (Yes in #231), the frame number is incremented by one and displayed. On the other hand, the address controller 421 outputs the address data corresponding to the updated frame number in order to reproduce the image of the relevant frame number (#232, #233). Subsequently, the TV is operated to monitor the image information corresponding to the current frame number (#234) in the same manner as xplained earlier. Then, this routine returns to Step #231 and repeats these steps each time the access switch ST is pressed. On the other hand, in Step #235, it is checked whether the access switch ST is in ON-state. When the access switch ST is in ON-state (Yes in Step #235), this routine returns to Step #231. When the access switch ST is in OFF-state (No in Step #235), this routine proceeds to Step #236.

Next, this routine proceeds to Step #237 when the access switch SW is in ON-state (Yes in Step #236) instead of the access switch ST. This routine proceeds to Step #240 when the access switch SW is kept its state or turned off (No in Step #236).

In Step #236, it is determined that the access switch SW is pressed, the frame number is decremented by one and is displayed. Simultaneously, the address controller 421 outputs the address data corresponding to the updated frame number in order to reproduce an image of the relevant frame number (#238). Subsequently, the image information corresponding to the current frame number (#239) is presented on the TV screen in the same manner as explained earlier. Then, this routine returns to Step #236. This routine repeats these steps each time the access switch SW is pressed. In Step #240, it is checked whether the access switch SW is in ON-state. This routine returns to Step #236 when the access switch SW is in ON-state (Yes in Step #240). This routine proceeds to Step #252 when the access switch SW is in OFF-state (No in Step #240).

In Step #252, it is checked whether the erasure switch SE is in ON-state. When the erasure switch SE is in ON-state (Yes in Step #252), the image currently monitored on the TV screen is erased from the IC card 110 or internal memory 405 (#253). Then, this routine returns to Step #203. If, however, the erasure switch SE is not in ON-state (No in Step #252), this routine returns directly to Step #203.

Steps after Step #241 show a checking routine for the access switches ST and SW when the camera is set in the photography mode. When the access switch ST is in ON-state (Yes in Step #241), the focal distance of the object lens 102 is set to the telephoto position (#242). When the access switch SW is in ON-state (Yes in Step #243), the object lens 102 is set to the wide-angle position (#244). If both the access switches ST and SW are in OFF-state, the object lens 102 is left at a current focal position. At the end of the above interrupt routine, it is checked whether the uncharged flag is set to "1" (#245). If the uncharged flag is set to "1", this routine resumes the charging process (#246), which is interrupted when the interrupt operations are executed without fully charging the capacitor of the electronic flash, and returns to th main routine. If the uncharged flag is set to "0", this routine directly returns to the main routine.

Although digital memories are used as storage media in the above preferred embodiments, analog memories may be used. For example, a floppy disc may be employed instead of the IC card 110 used in the first camera. Also, in the second camera, although an internal memory is used as storage medium, it is possible to use a memory removably mountable on the camera body.

The above preferred embodiments of the present invention employ the thermal transfer printing manner. Alternatively, it is possible to use a thermal printer, sublimation type printer or melt out type printer. Also, a black and white printer may be used instead of the color printer.

Although the present invention has been fully described by way of example with reference to the accompanying drawings, it is to be understood that various changes and modifications will be apparent to those skilled in the art. Therefore, unless otherwise such changes and modifications depart from the scope of the present invention, they should be construed as being included therein.

Claims

1. Camera capable of recording and reproducing a photographed image comprising:
storage means for storing a photographed image; and
reproduction means for reproducing an photographed image stored in the storage means on external reproduction paper.

2. Camera according to Claim 1 wherein the reproduction means is a printer.

3. Camera according to Claim 1 further comprising:
a reproduction head for reproducing the photographed image on the external reproduction paper;
transfer means for transferring the photographed image from the storage means to the reproduction head;
an opening portion facing the external reproduction paper;
driver means for running the reproduction head within the opening portion; and
indication means for indicating a reproducing position on the external reproduction paper.

4. Camera according to Claim 2 wherein the printer has a thermal transfer device.

5. Camera according to Claim 1 wherein the storage means is a digital memory.

6. Camera according to Claim 5 wherein the digital memory is removably mountable on the camera.

7. Camera according to Claim 1 wherein the reproduction means is a color printer.

8. Camera capable of recording and r producing a photographed image comprising:
storage means for storing a plurality of photographed images;
selection means for selecting one image from the plurality of photographed images stored on the storage means; and
printer means for printing the selected image.

9. Camera according to Claim 8 wherein the printer means is adopted for printing the selected image on external reproduction paper.

10. Camera according to Claim 8 further comprising:
a reproduction head for reproducing the photographed image on the external reproduction paper;
transfer means for transferring the photographed image from the storage means to the reproduction head;
an opening portion facing the external reproduction paper;
driver means for running the reproduction head within the opening portion; and
indication means for indicating a reproducing position on the external reproduction paper.

11. Camera according to Claim 8 wherein the printer has a thermal transfer device.

12. Camera according to Claim 8 wherein the storage means is a digital memory.

13. Camera according to Claim 12 wherein the digital memory is removably mountable on the camera.

14. Camera according to Claim 9 wherein the reproduction means is a color printer.

15. Camera capable of recording and reproducing a photographed image comprising:
a main body;
reproduction means carried by the main body, the reproduction means including a reproducing head, and being changeable from a first position where the reproducing head is placed in the main body when recording to a second position where the reproducing head is withdrawn from the main body when reproducing and vice versa; and
changer means for changing the reproduction means from the first position to the second position and vice versa.

16. Camera according to Claim 15 wherein the reproduction means is a printer.

17. Camera capable of recording and reproducing a photographed image, being changeable from a first mode where photography is executed and a photographed image is recorded to a second mode where the recorded image is printed and vice versa, comprising:
changer means including an operable member for changing the camera from first mode to the second mode and vice versa by the same operable member.

18. Camera according to Claim 17 wherein the

operable member is adopted for starting the photography in the first mode, and for starting the printing in the second mode.

19. Camera according to Claim 17 wherein the operable member is adopted for changing the focal length of a lens in the first mode, and for selecting an image from the recorded images in the second mode.

20. Camera comprising:

printer means for printing a photographed image recorded on a recording medium on external reproduction paper, the printer means including;

an opening portion facing the external reproduction paper; and

a presser member positionable above the opening portion for pressing the external reproduction paper.

21. Camera according to Claim 20 further comprising a main body wherein the presser member is pivotable in relative to the main body.

22. Camera according to Claim 20 wherein the presser member includes a flash.

23. Camera according to Claim 20 wherein the presser member includes a display portion for displaying the photographed image.

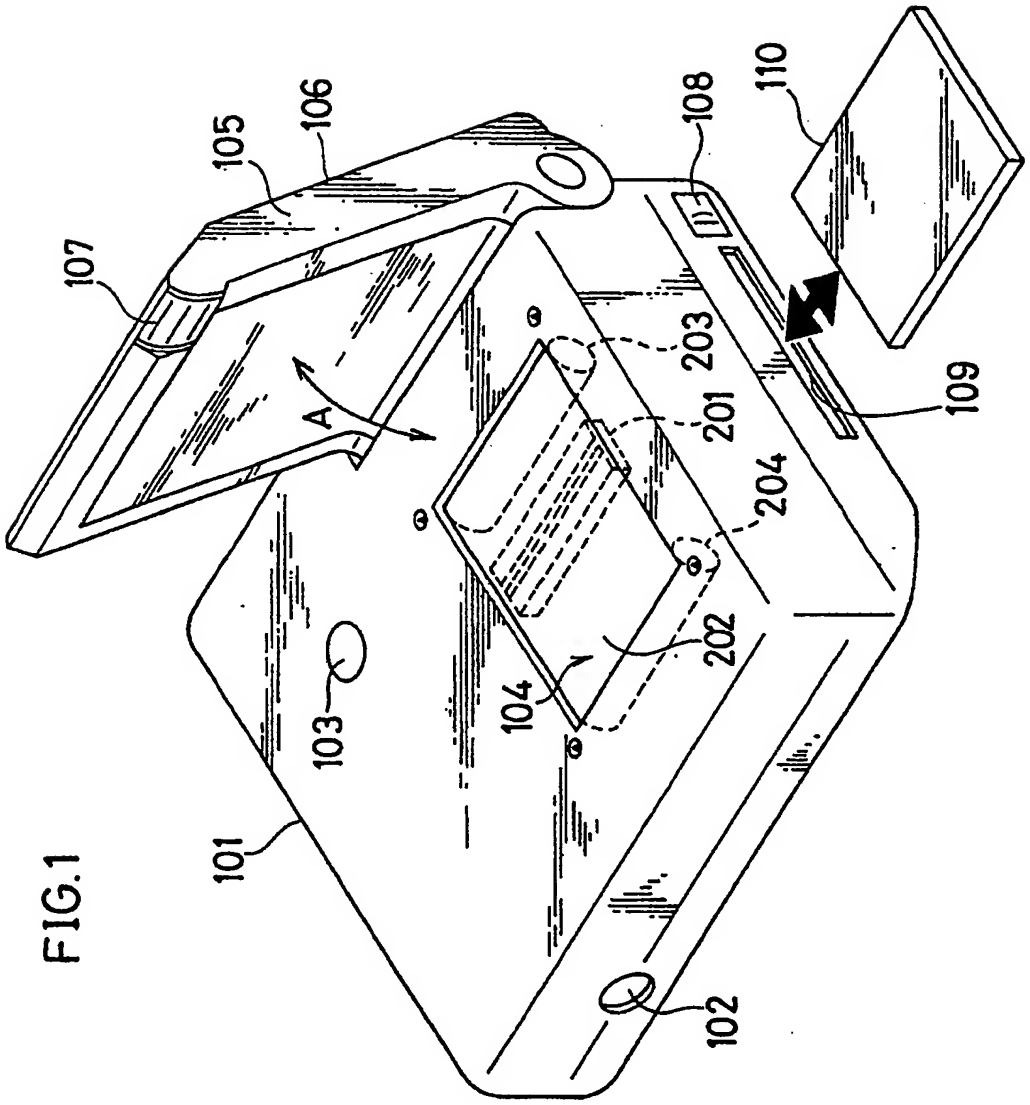


FIG.1

FIG.2A

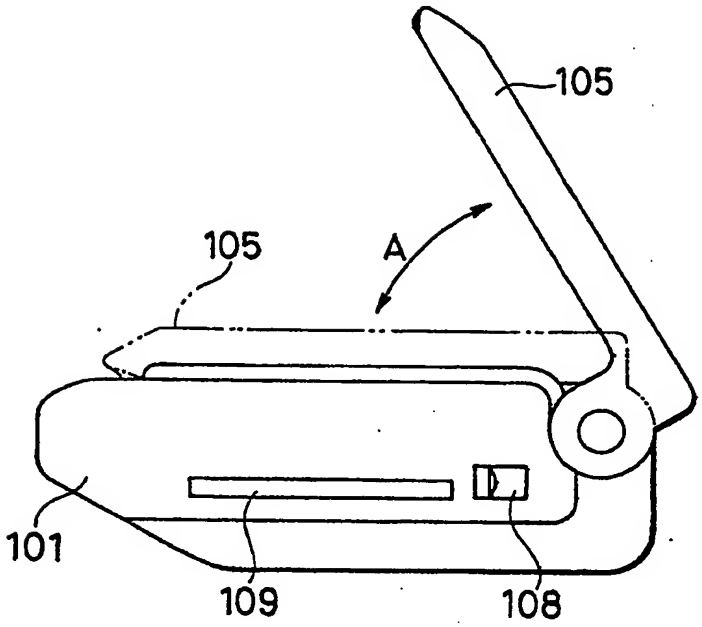


FIG.2B

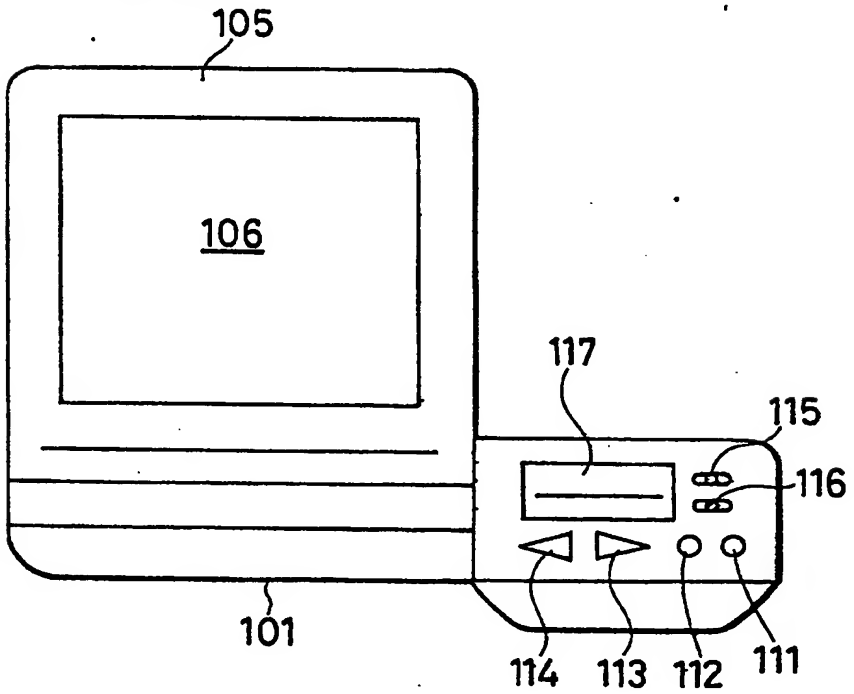
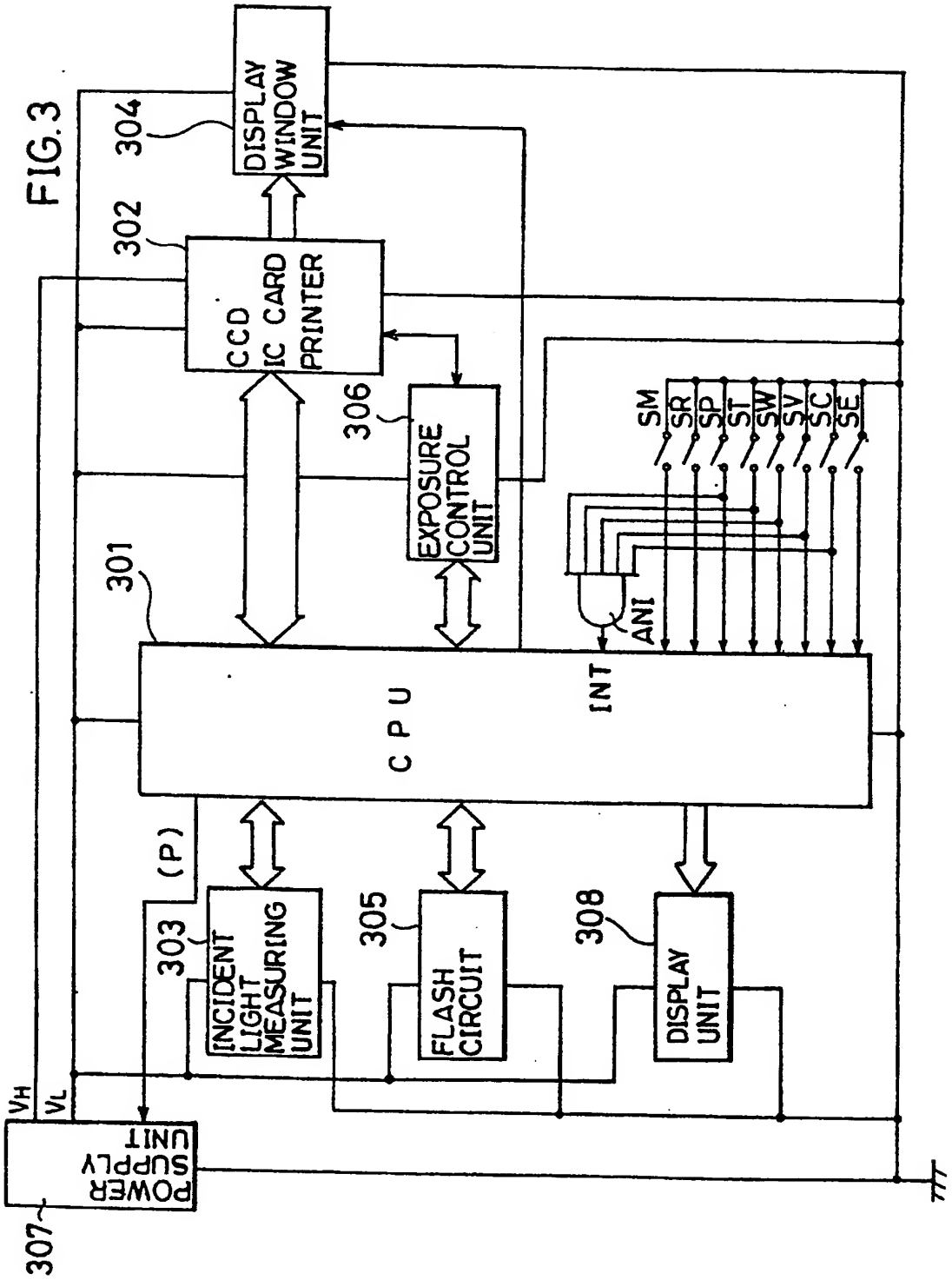


FIG.3



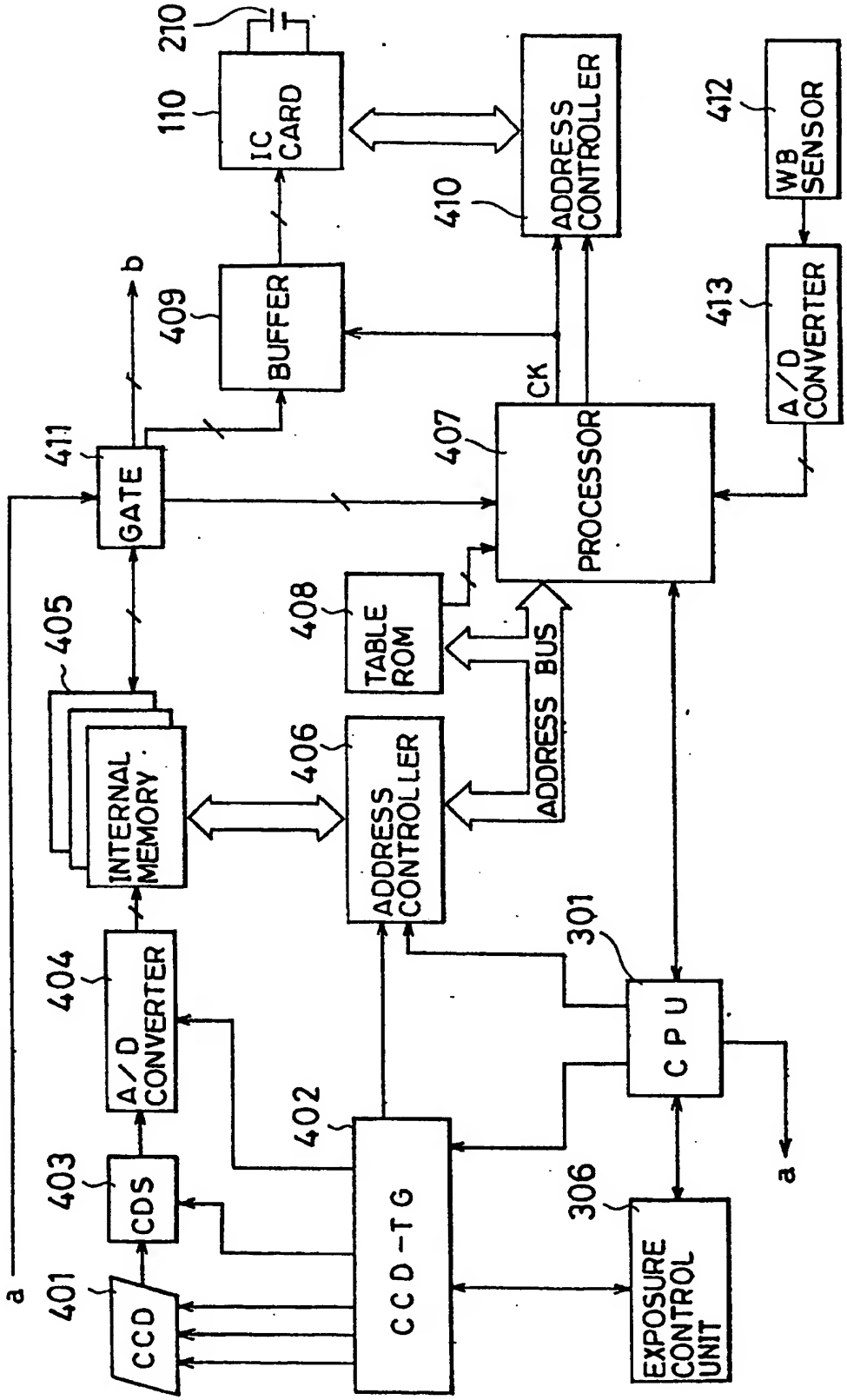


FIG.4

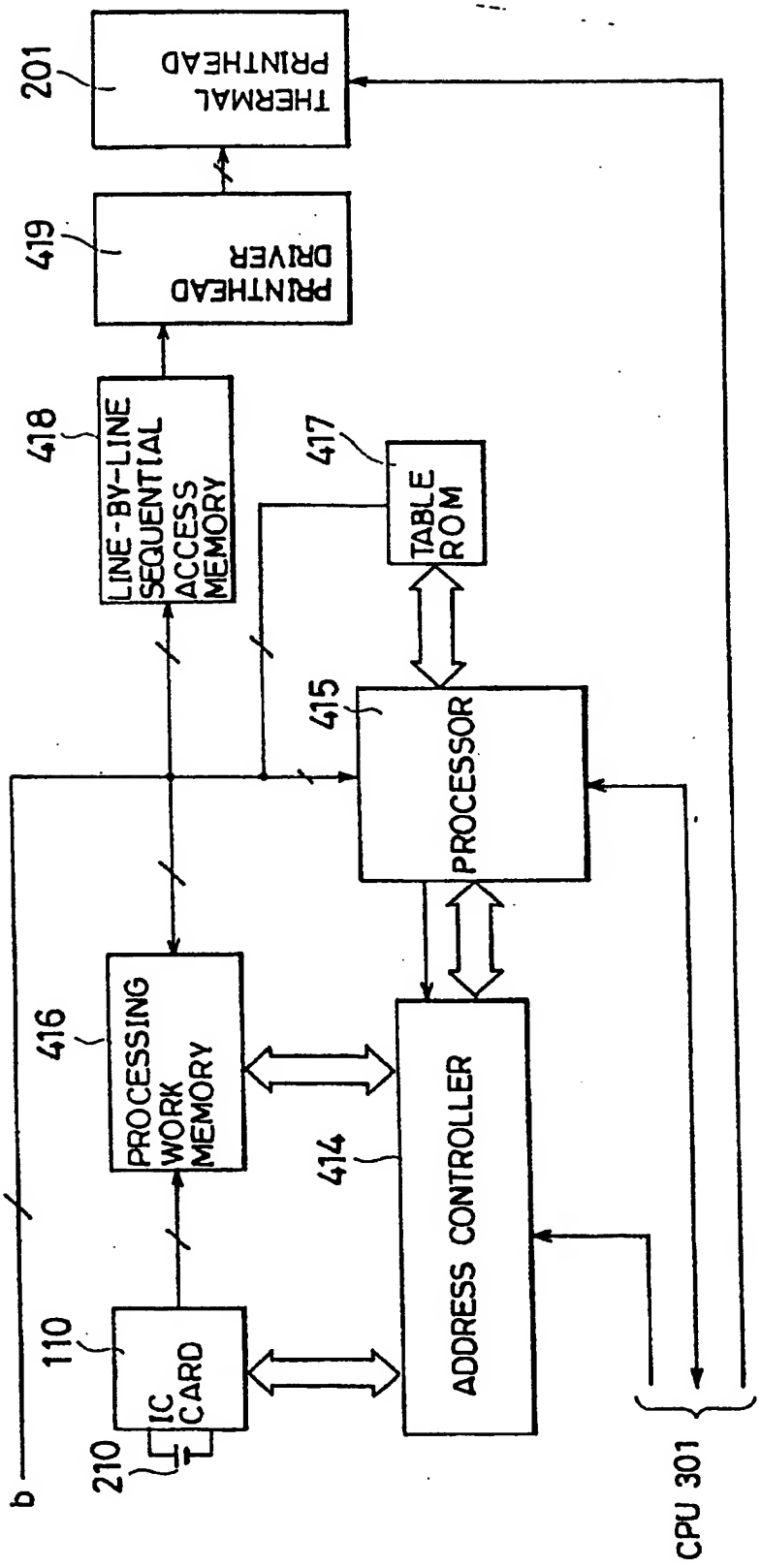


FIG.5

FIG.6

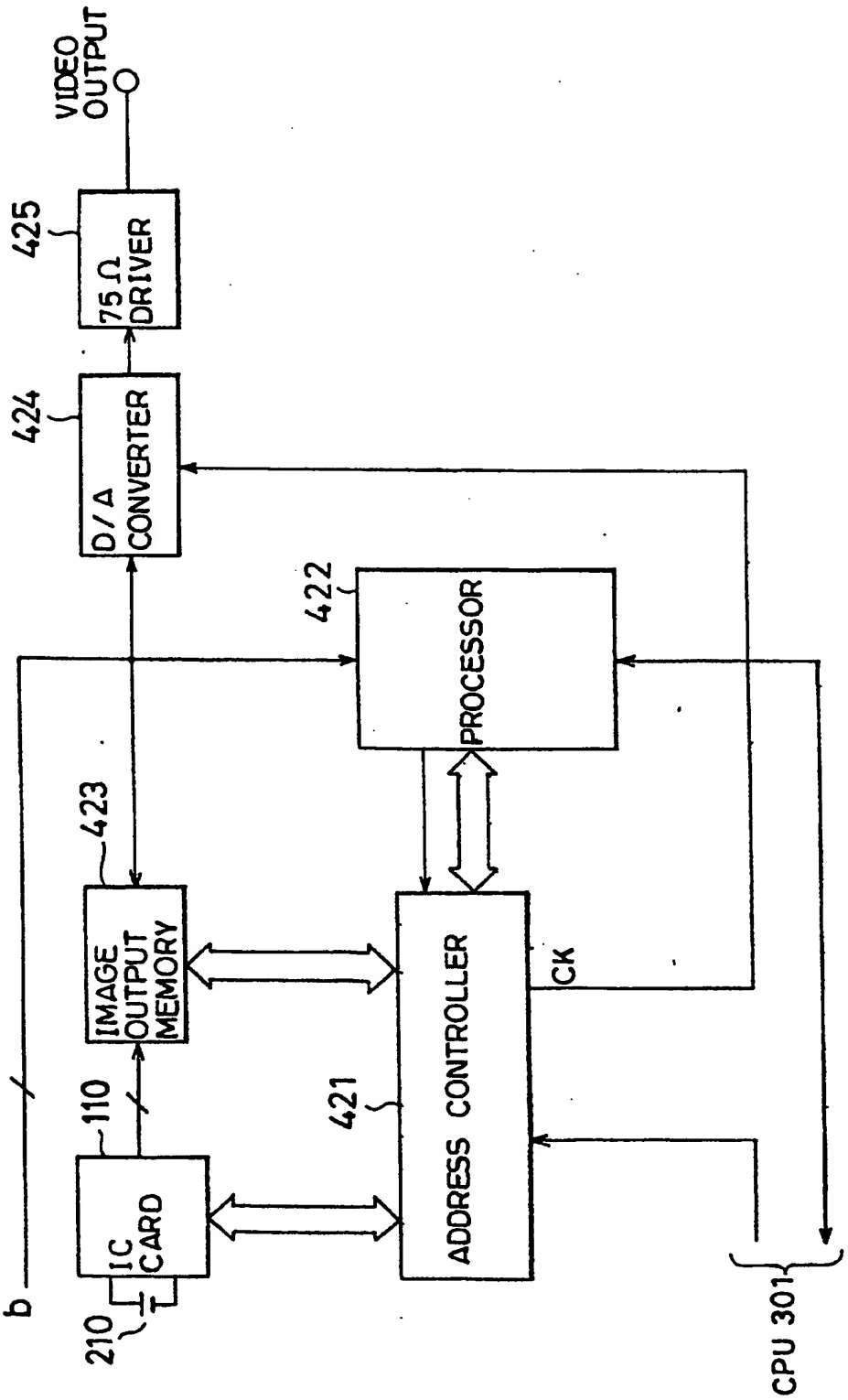


FIG.7

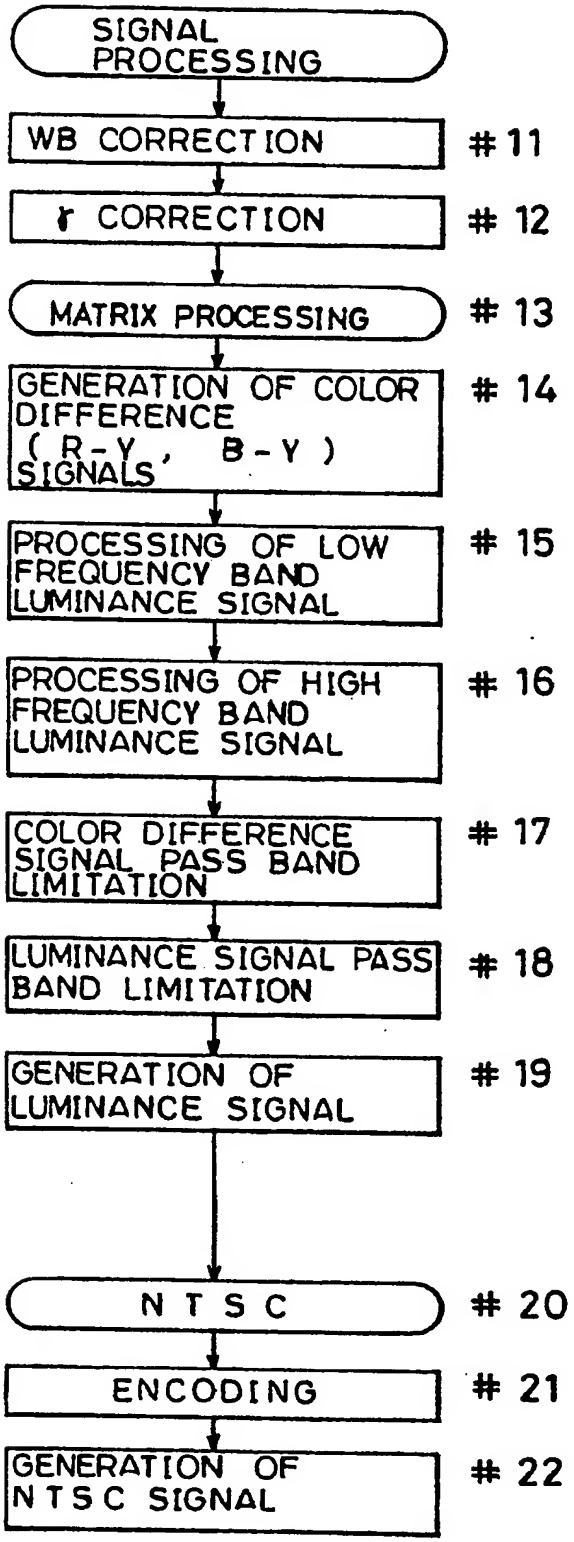


FIG.8

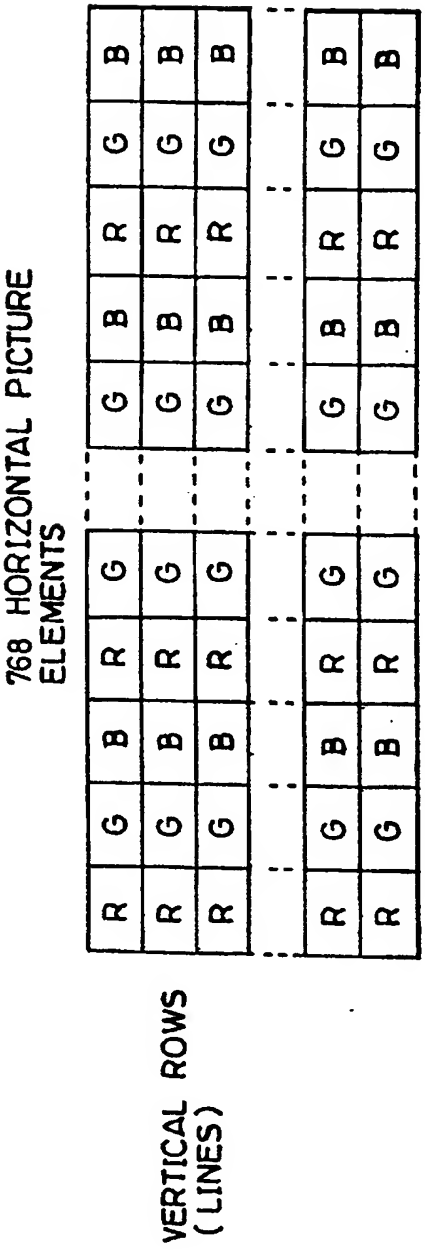


FIG.9A

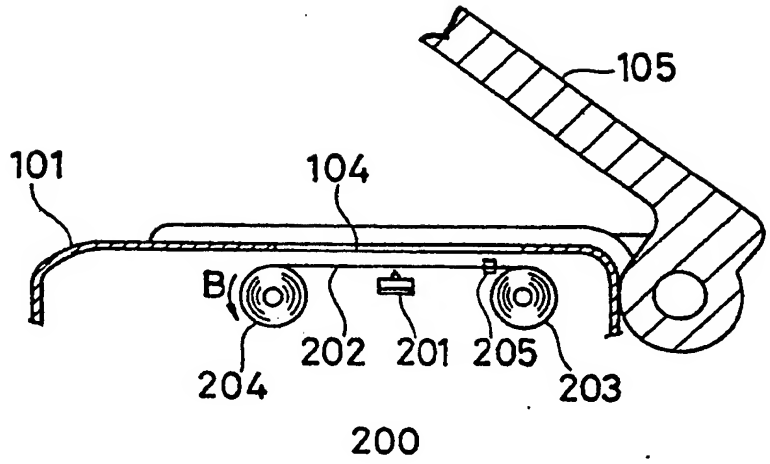


FIG.9B

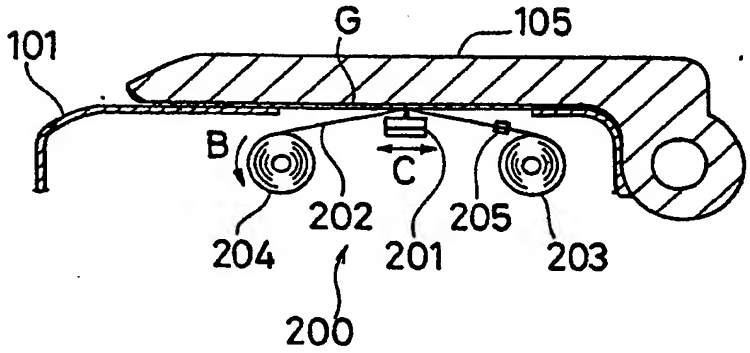


FIG.10

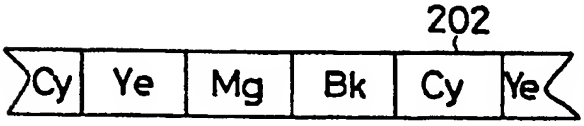


FIG.11

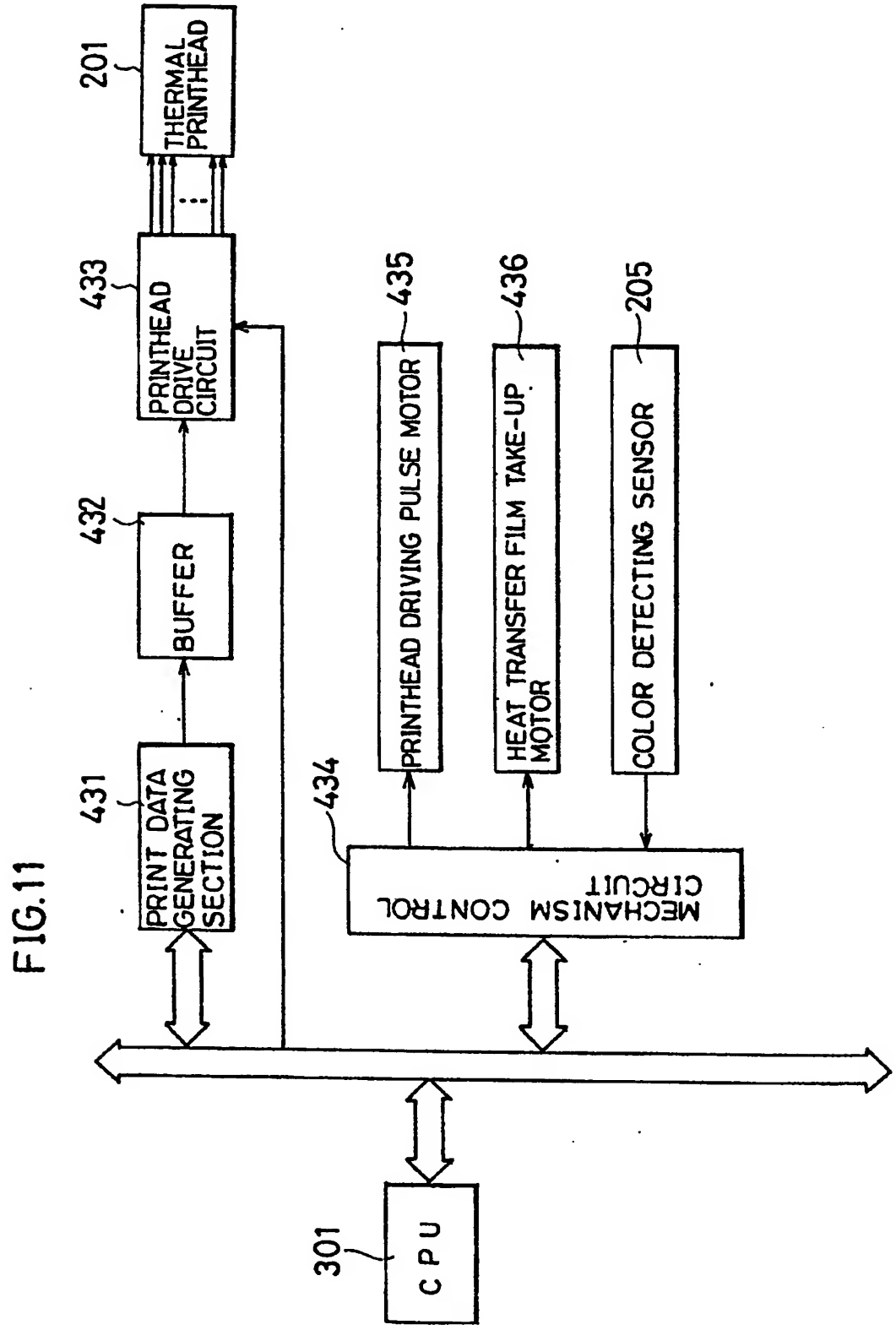


FIG.12A

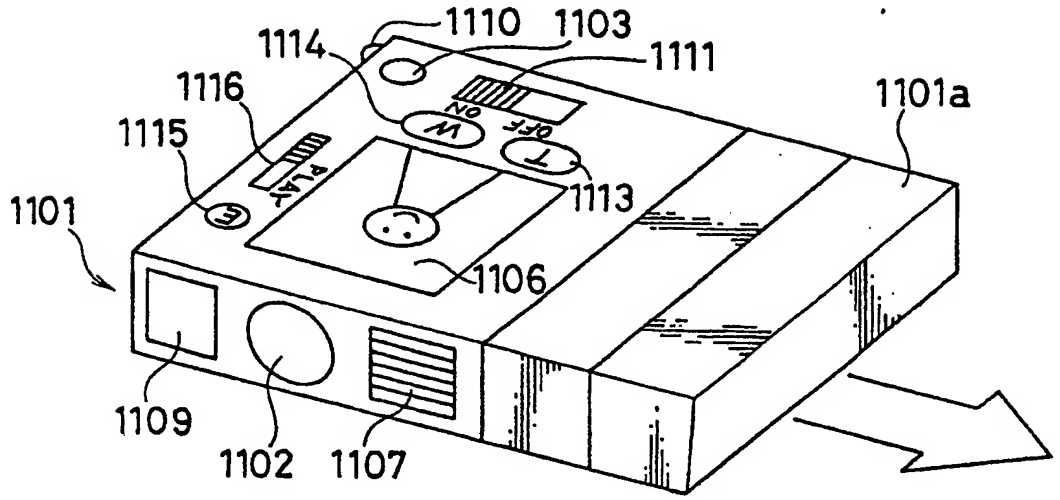


FIG.12B

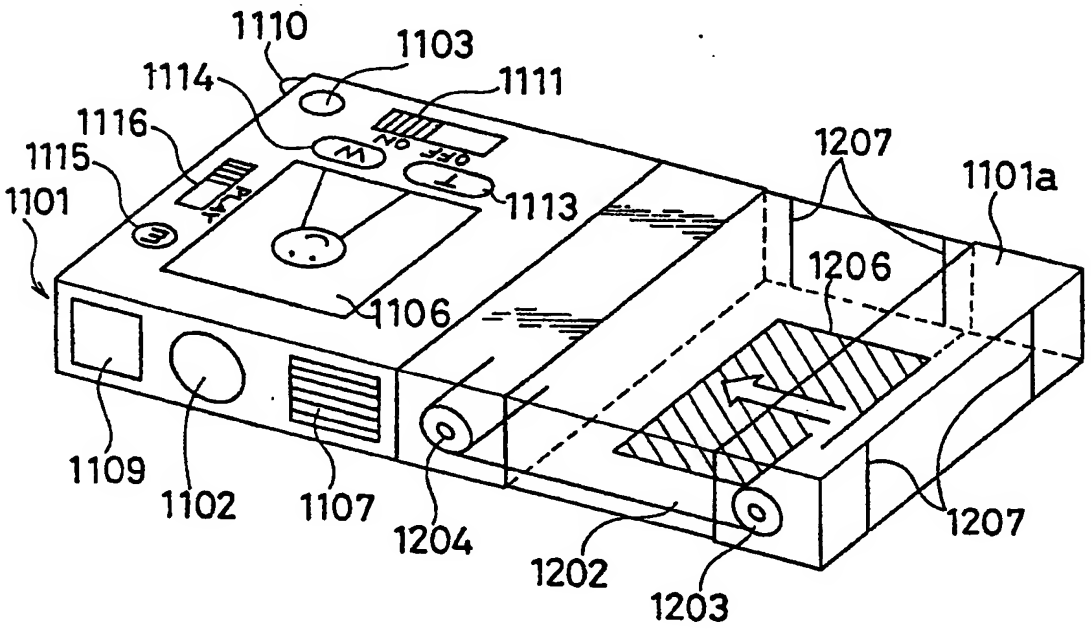
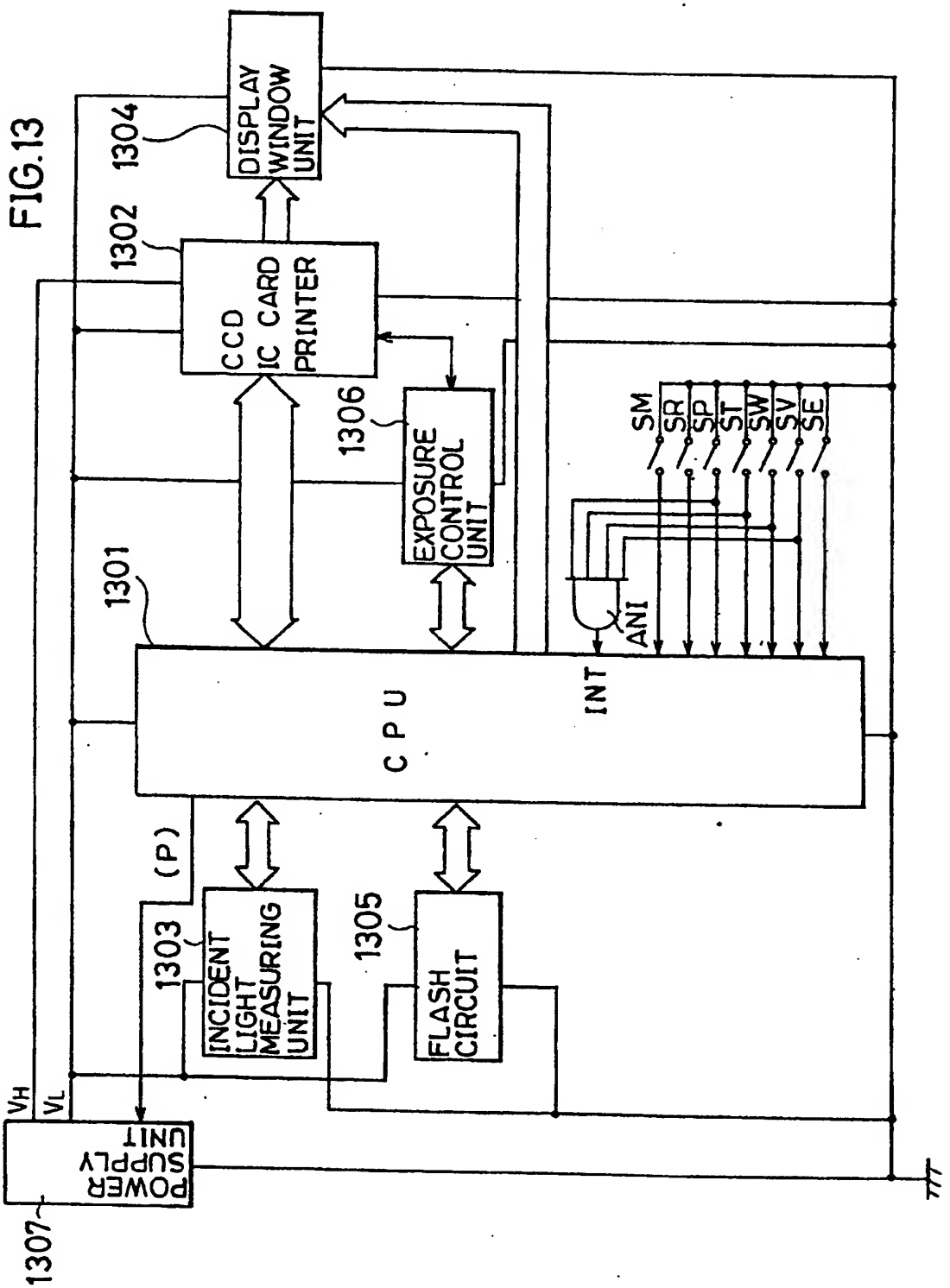


FIG.13



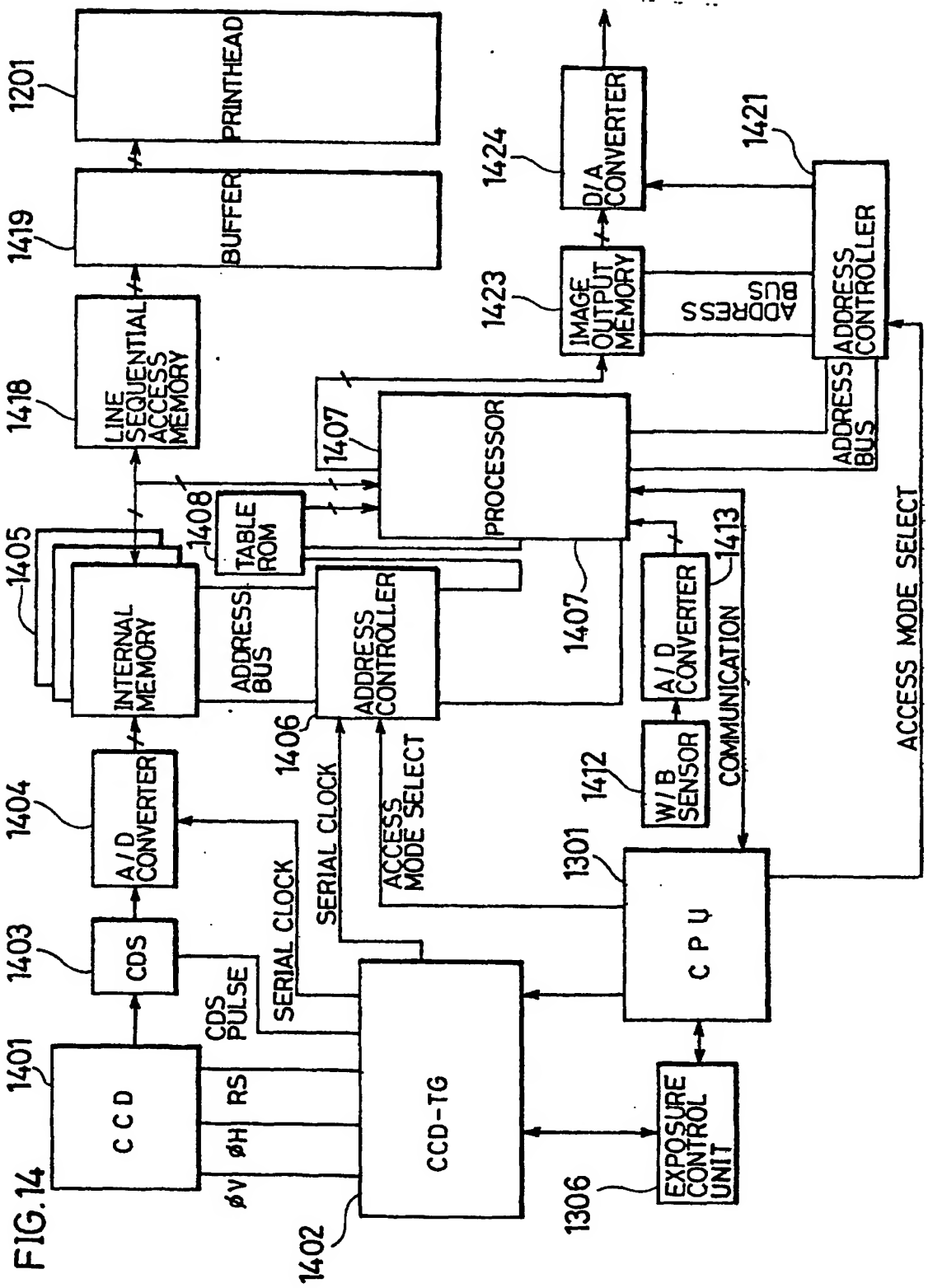


FIG. 14

FIG.15B

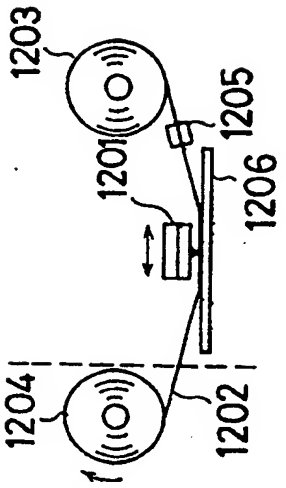
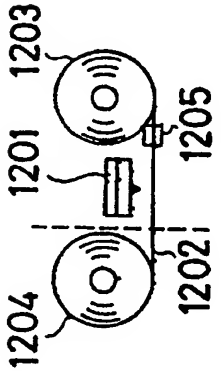


FIG.15A



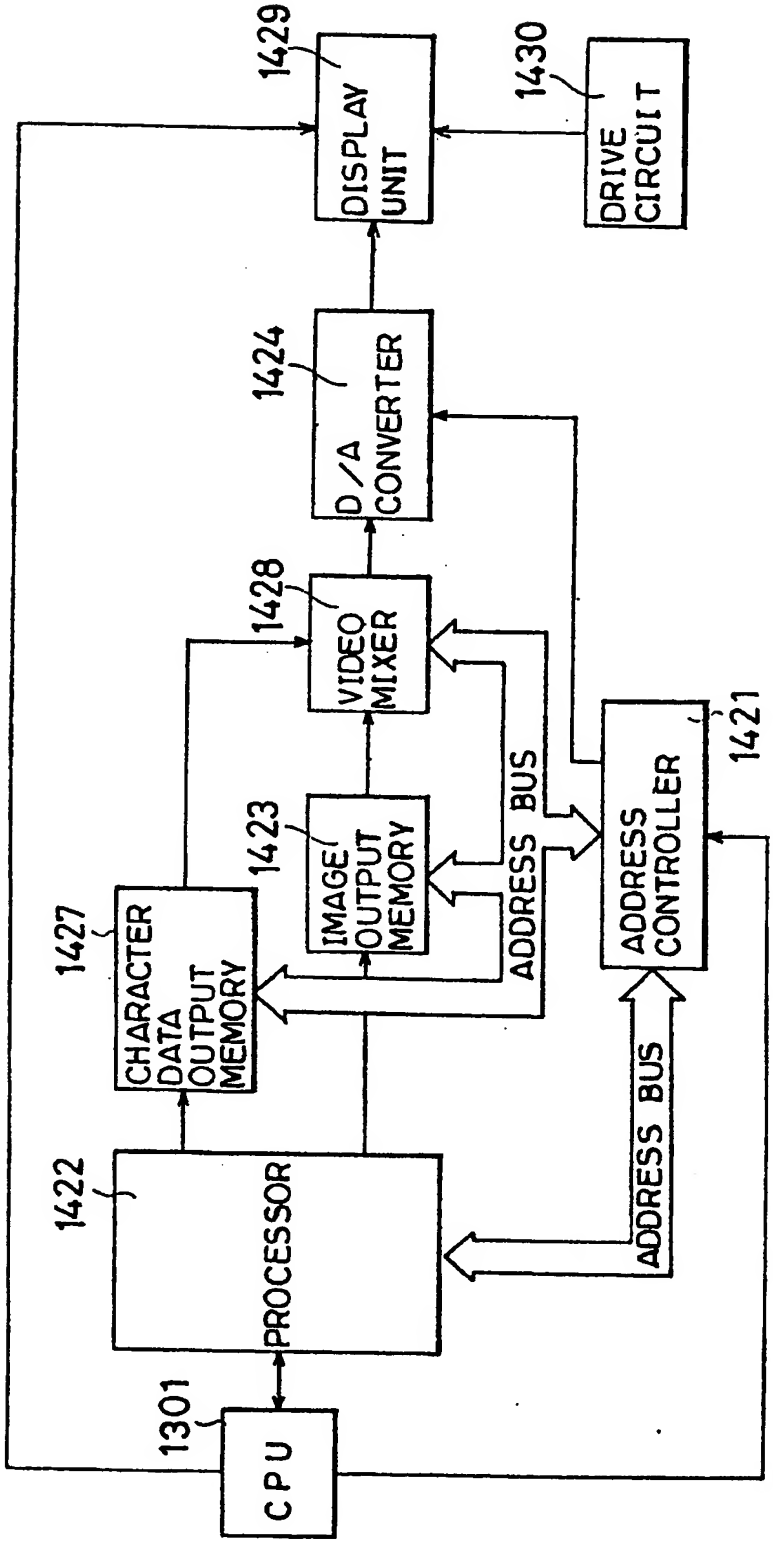


FIG.16

FIG.17A

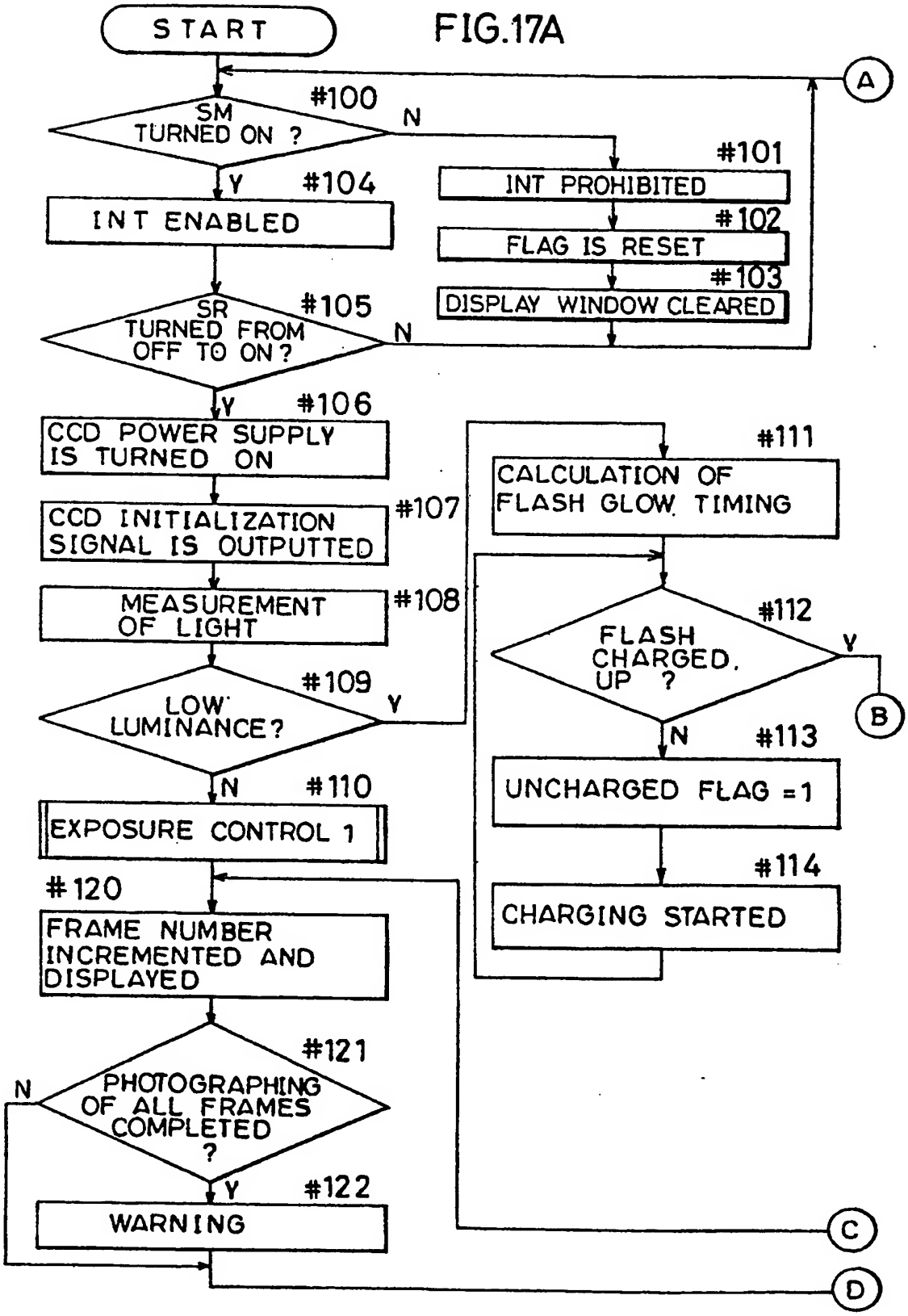


FIG.17B

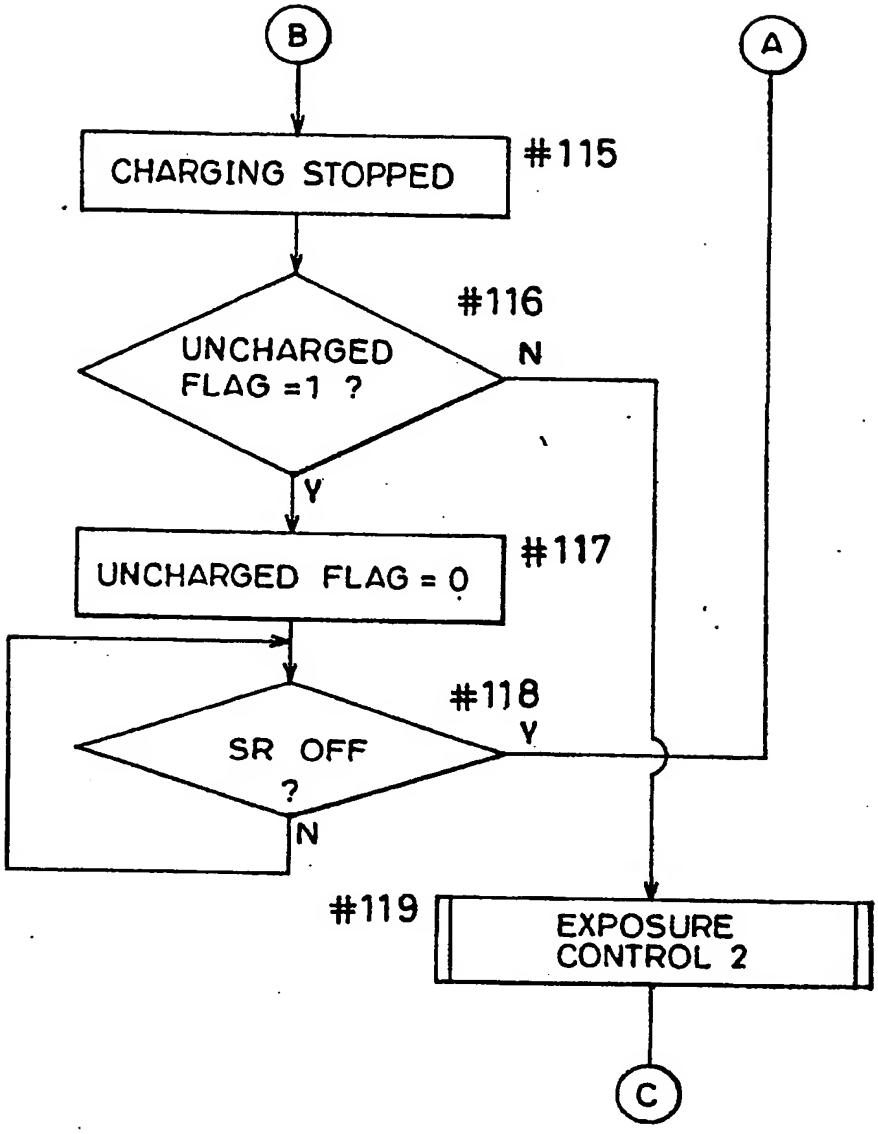


FIG.17C

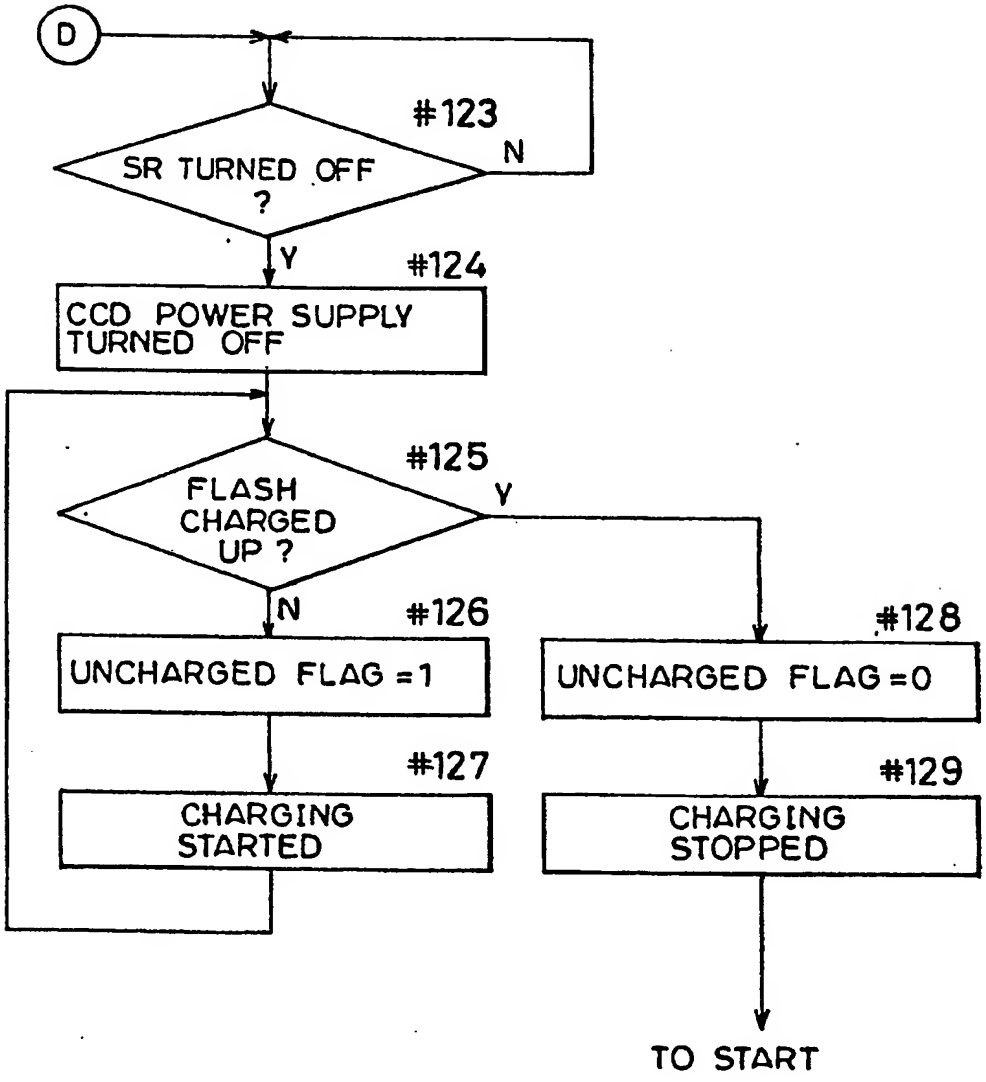
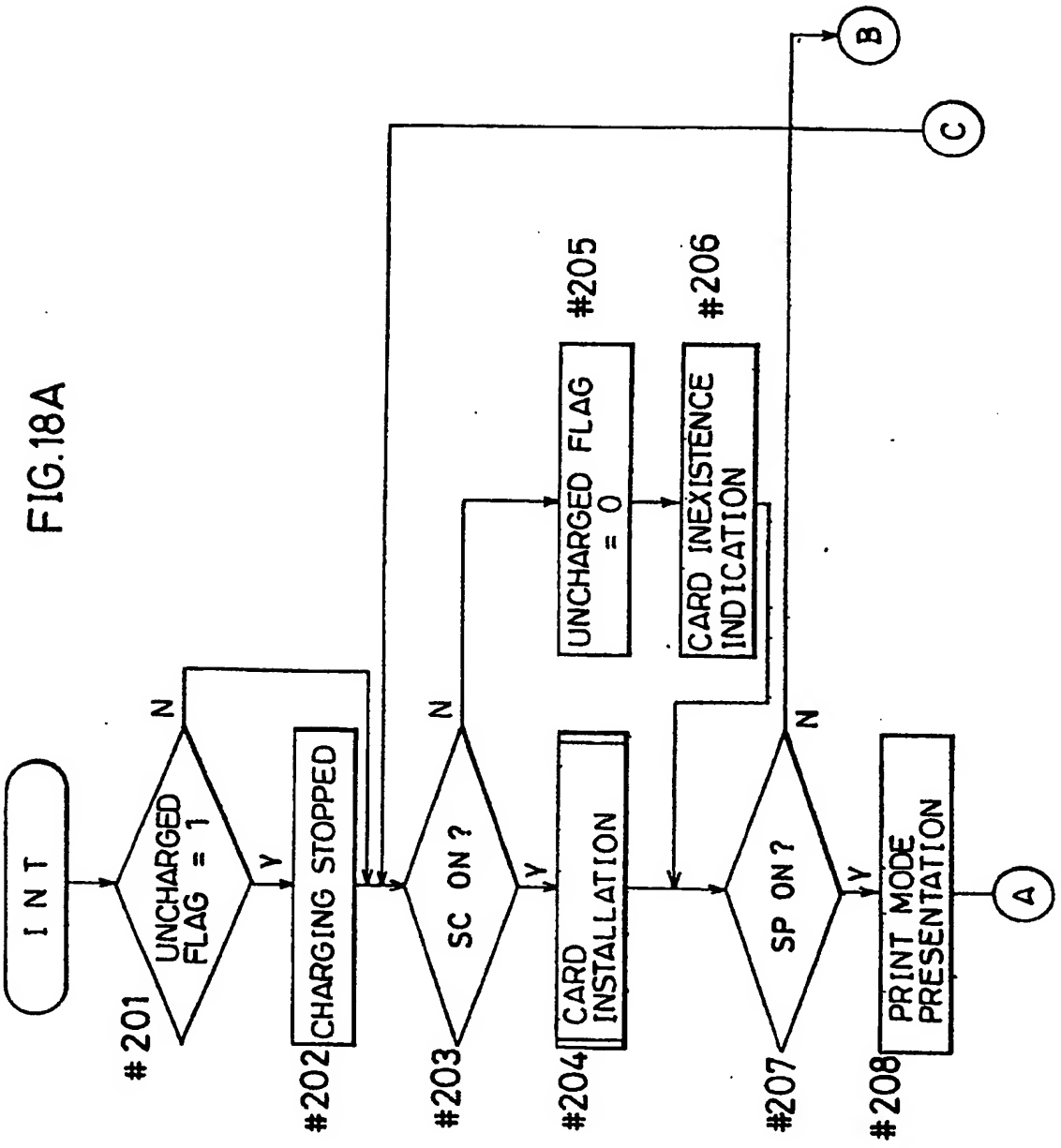


FIG.18A



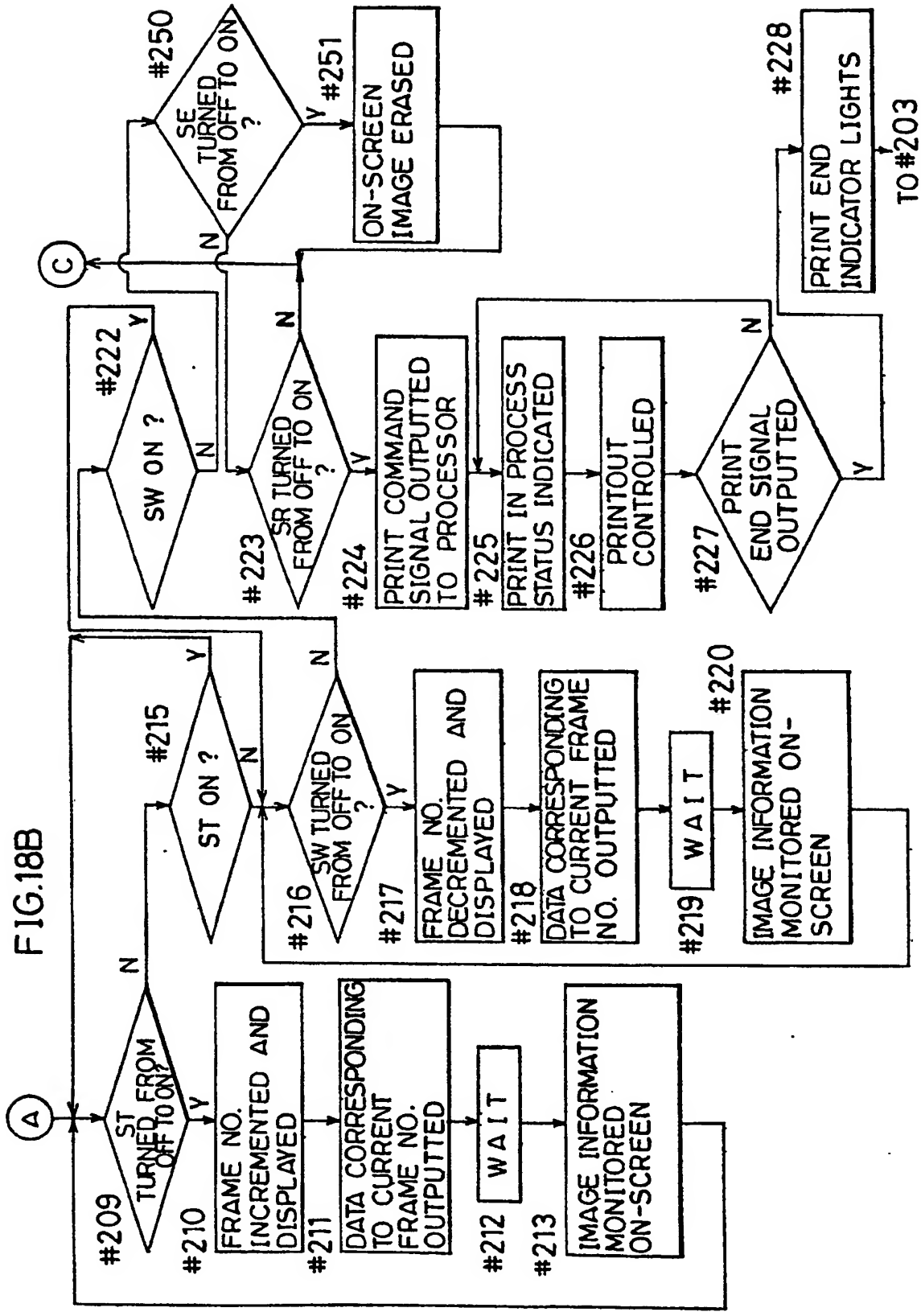


FIG.18B

FIG.18C

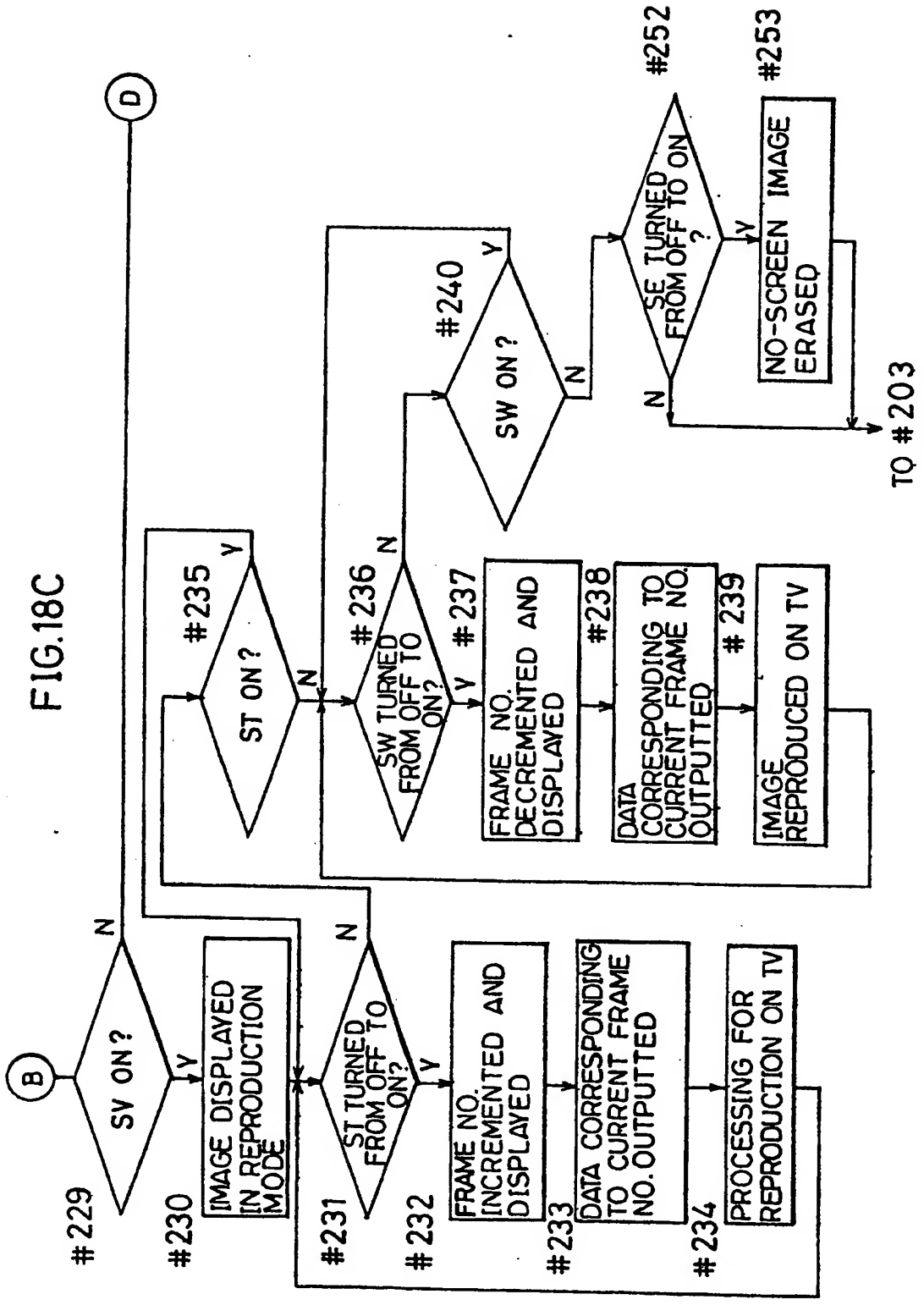


FIG.18D

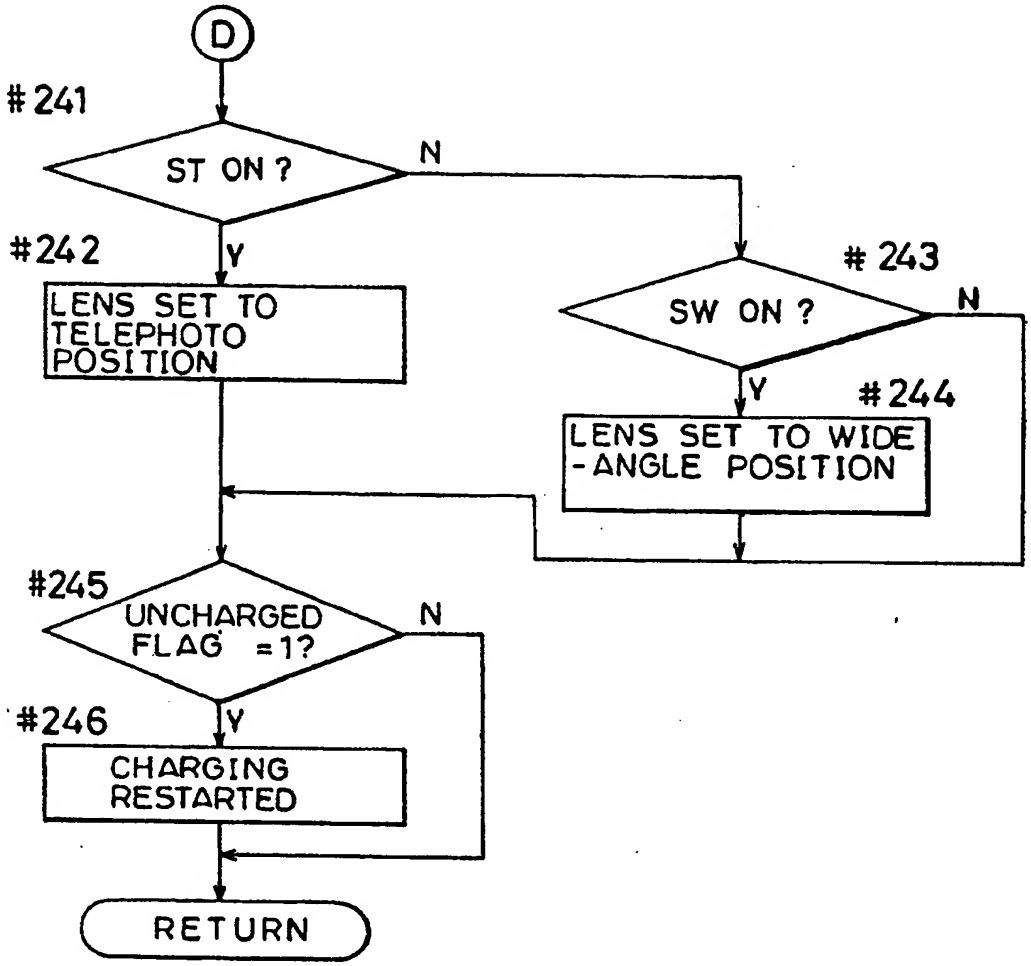


FIG.19A

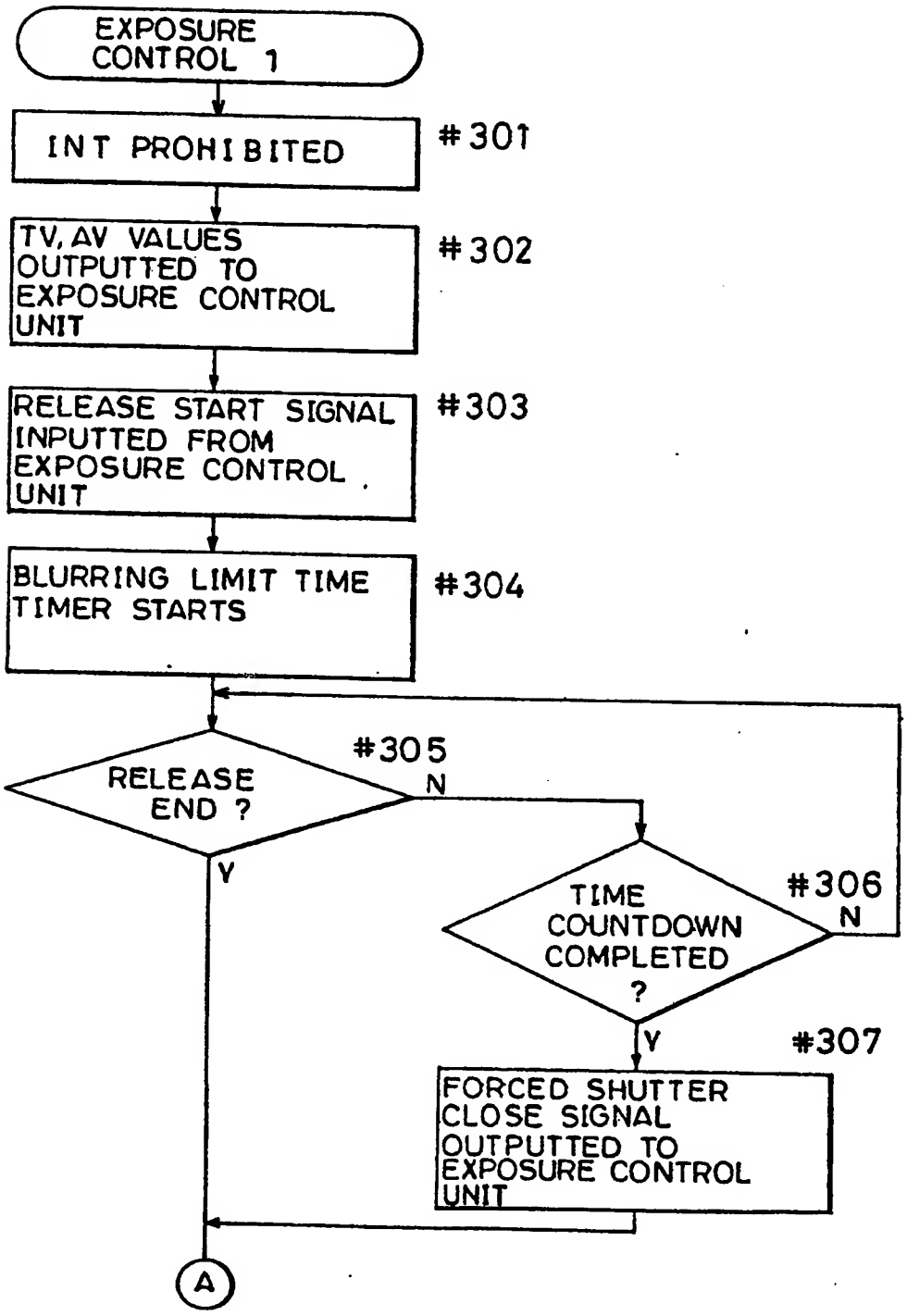


FIG.19B

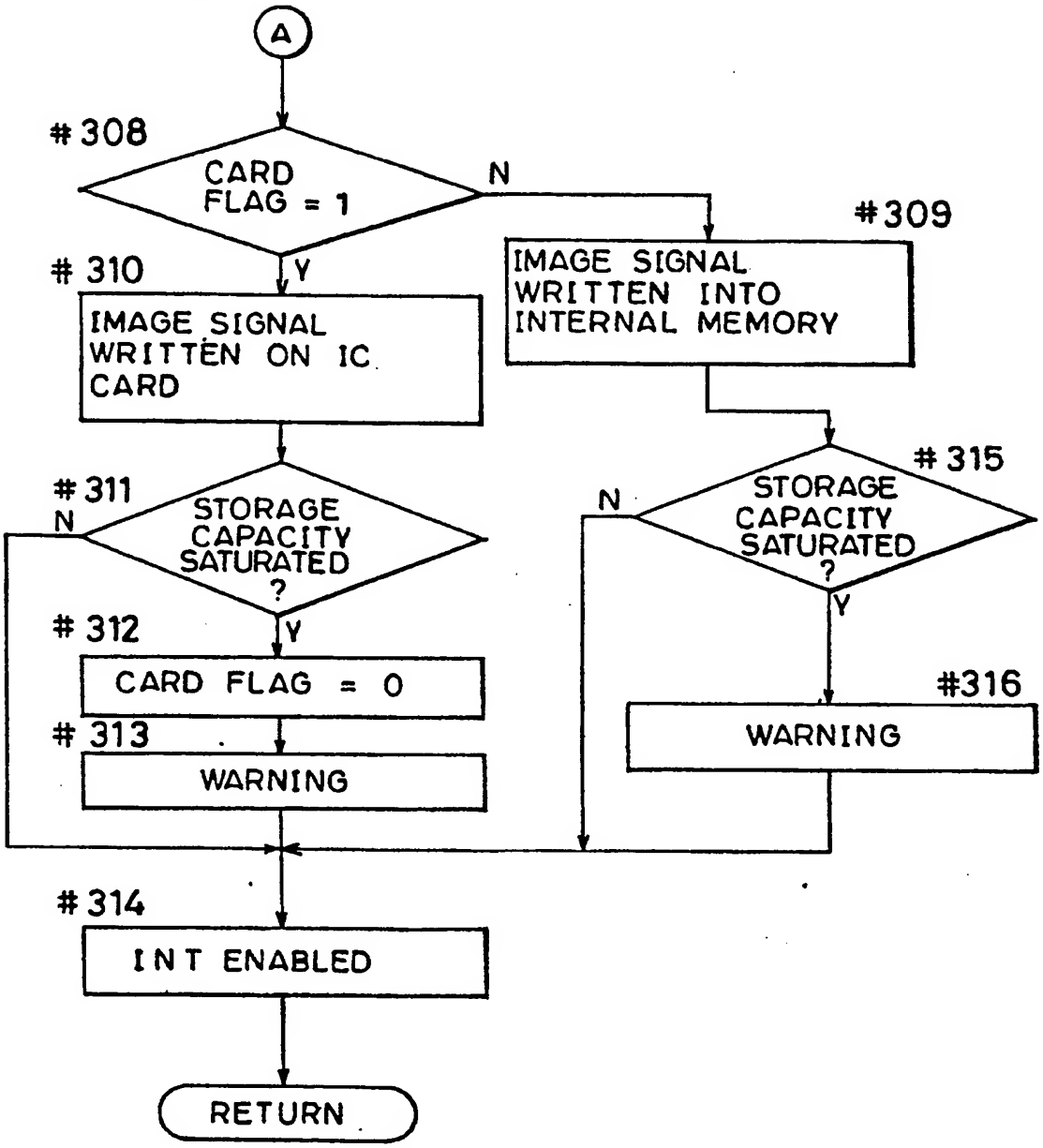


FIG.20A

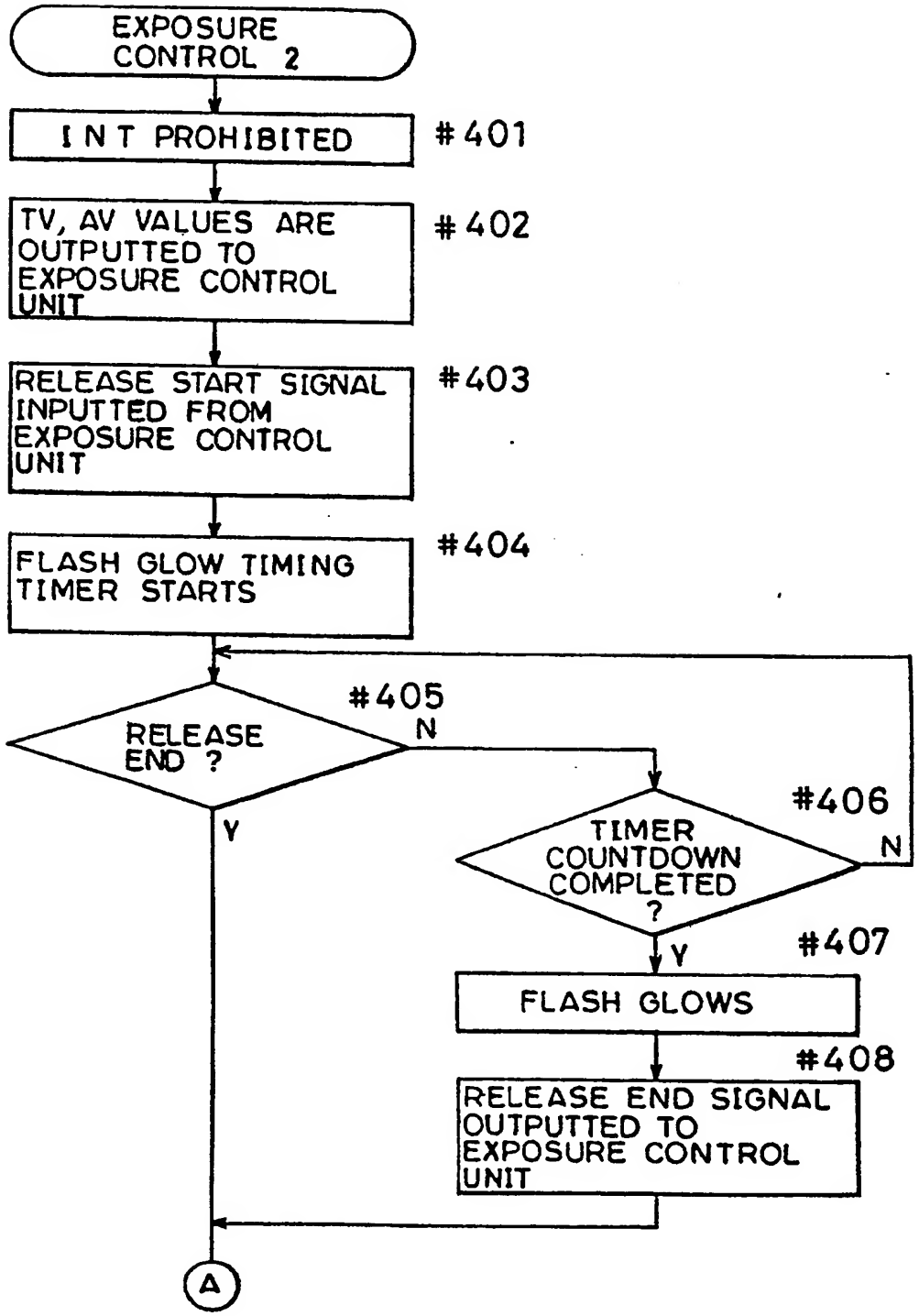


FIG.20B

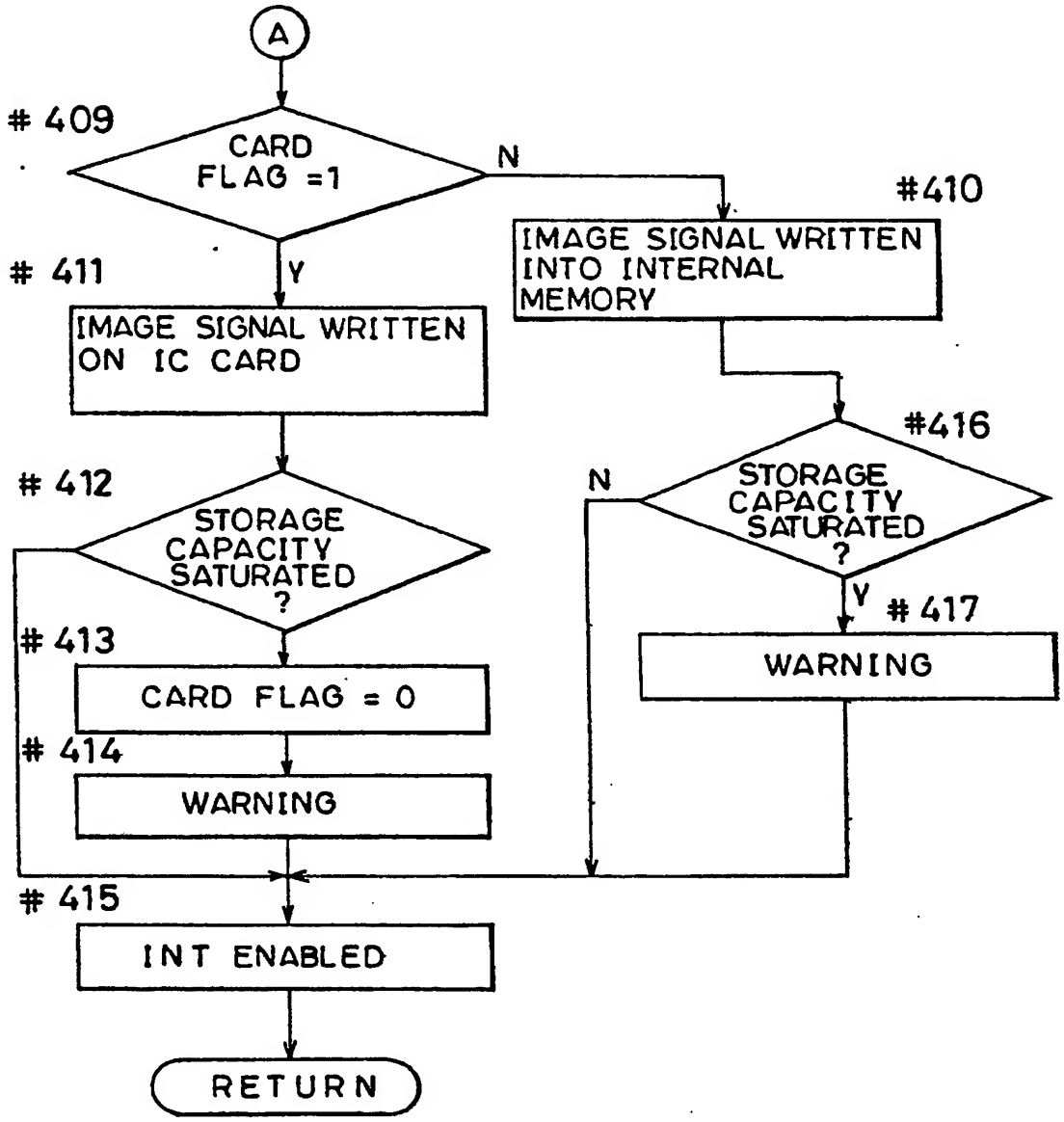
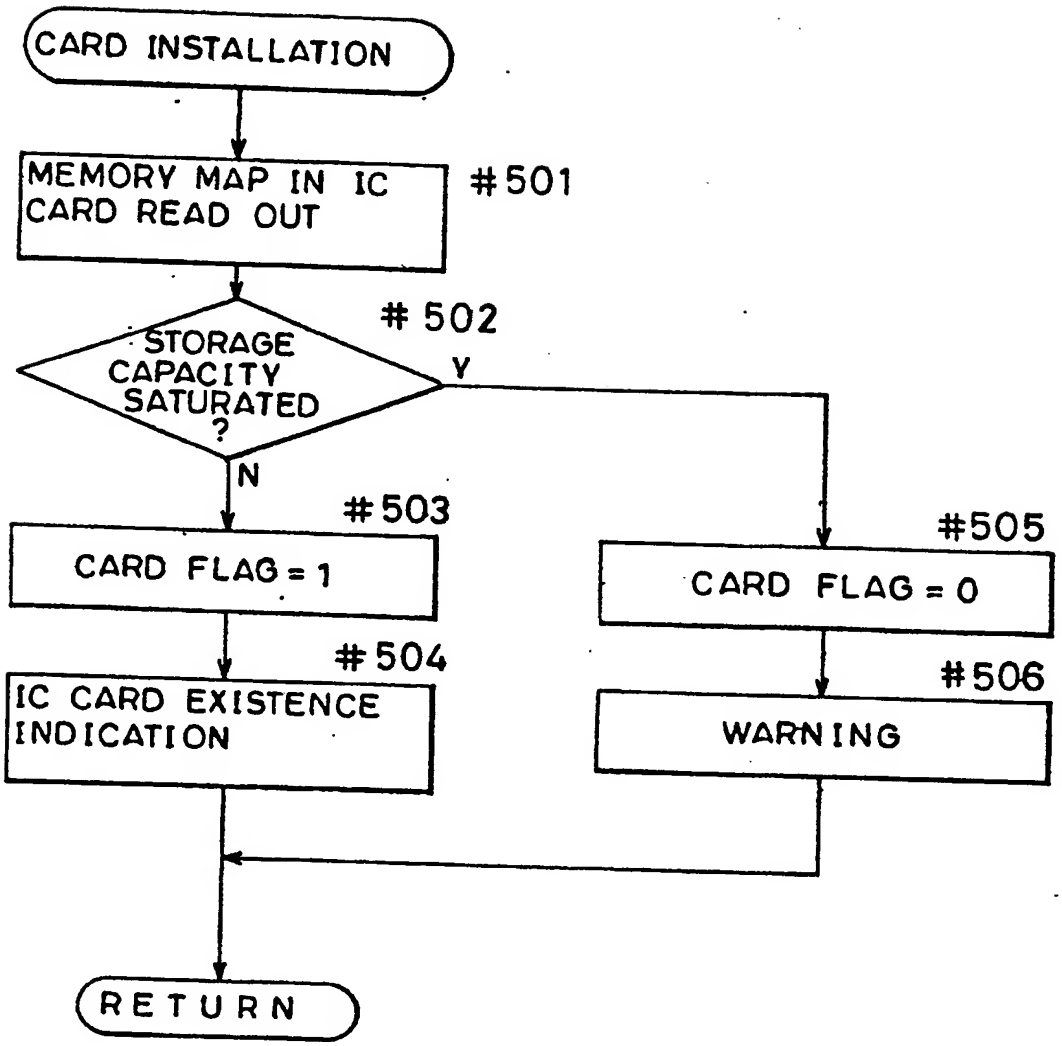


FIG.21



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Inventor: Ishibe, Hiroshi, c/o Minolta Camera K.K.
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(54) A camera capable of recording and reproducing a photographed image.

(57) A camera (101) able to record and reproduce a photographed image includes a storage medium (110) for storing a photographed image, and a reproduction device for reproducing the photographed image. The reproduction device has a reproducing head (201) movable b tween a contraction position and a withdrawal position. Another camera has a first mode where photography is executed and a photographed image is recorded to a second mode where the recorded image is printed. Another camera has a printer device for printing a photographed image recorded on a recording medium on external reproduction paper, the printer device including an opening portion facing the external reproduction pa-

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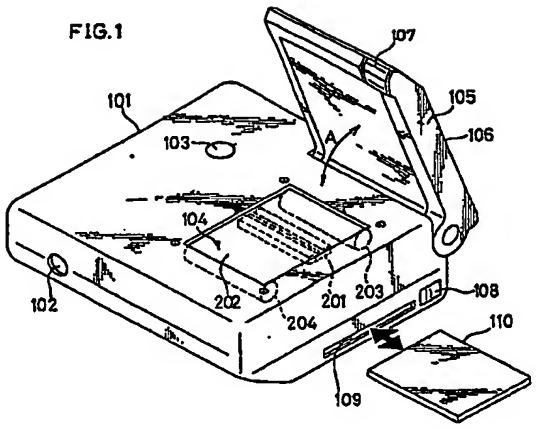
per, and a presser memb r positionable above the opening portion for pressing th xternal reproduction paper.

FIG.1



European Patent Office

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Application Number

EP 90109246.0

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
D,A	PATENT ABSTRACTS OF JAPAN, unexamined applications, E field, vol. 11, no. 20, January 20, 1987 THE PATENT OFFICE JAPANESE GOVERNMENT page 21 E 472 * Kokai-no. 61-189 785 (TOSHIBA) *	1-4,7, 15,16, 20,23	H 04 N 5/225 H 04 N 1/00
A	US - A - 4 489 351 (D'ALAYER DE COSTEMORE D'ARC) * Abstract; fig. 1,2 *	8,12, 13	
A	US - A - 4 131 919 (LLOYD) * Abstract; fig. 2 *	17	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

H 04 N 5/00
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	18-02-1991	BENISCHKA

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
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T : theory or principle underlying the invention
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L : document cited for other reasons

& : member of the same patent family, corresponding document

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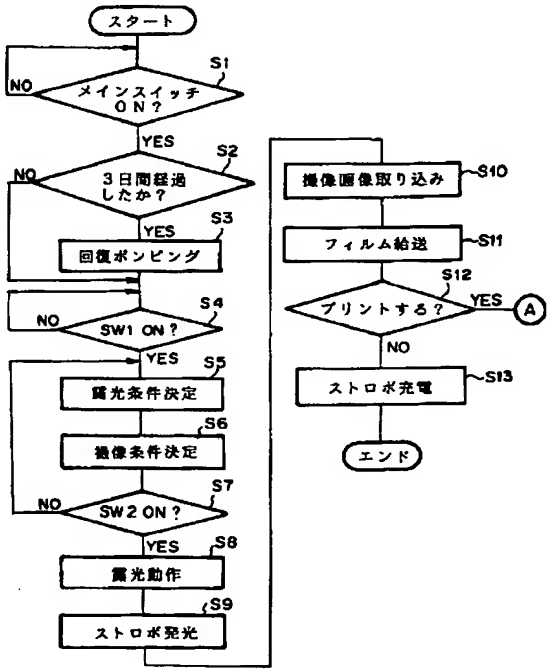
(54)【発明の名称】　プリンター付撮影装置

(57)【要約】

【課題】　複合カメラにおいて、プリンター装置の動作とストロボ発光部のメインコンデンサーの充電動作を重複させないことを課題とする。

【解決手段】　映像情報を記録媒体に記録するストロボ発光部を有する撮影装置と、映像情報を記録用紙に出力するプリンター装置とを一体的に構成可能にしたプリンター付撮影装置において、ストロボ発光部の動作をプリンター装置の動作中に制御する制御手段を有し、該制御手段は上記プリンター装置がプリント出力の動作を行なっている時には上記ストロボ発光部のメインコンデンサーへの充電動作を停止することを特徴とする。また、該制御手段は撮影装置のストロボ発光部のメインコンデンサーへの充電動作中にプリント動作を開始するプリント操作開始ボタンを入力した場合にはメインコンデンサーへの充電が完了するまで前記プリント動作を停止することを特徴とする。



【特許請求の範囲】
【請求項１】　映像情報を記録媒体に記録するストロボ発光部を有する撮影装置と、前記映像情報を記録用紙に出力するプリンター装置とを一体的に構成可能にしたプリンター付撮影装置において、
前記ストロボ発光部の動作を前記プリンター装置の動作中に制御する制御手段を有し、該制御手段は前記プリンター装置がプリント出力の動作を行なっている時には前記撮影装置の前記ストロボ発光部のメインコンデンサーへの充電動作を停止することを特徴とするプリンター付撮影装置。
【請求項２】　映像情報を記録媒体に記録するストロボ発光部を有する撮影装置と、前記映像情報を記録用紙に出力するプリンター装置とを一体的に構成可能にしたプリンター付撮影装置において、
前記プリンター装置のプリント動作を前記撮影装置の前記ストロボ発光部の動作中に制御する制御手段を有し、該制御手段は前記撮影装置の前記ストロボ発光部のメインコンデンサーへの充電動作中にプリント動作を開始するプリント操作開始ボタンが入力した場合には前記撮影装置の前記ストロボ発光部の前記メインコンデンサーへの充電が完了するまで前記プリント動作を停止することを特徴とするプリンター付撮影装置。
【請求項３】　映像情報を記録媒体に記録するストロボ発光部を有する撮影装置と、前記映像情報を記録用紙に出力するプリンター装置とを一体的に構成可能にしたプリンター付撮影装置において、
前記プリンター装置のプリント動作と前記撮影装置の前記ストロボ発光部の動作とを制御する制御手段を有し、該制御手段は前記プリント動作終了と前記ストロボ発光部の動作終了とを観察し、いずれかの前記動作の動作中に他の動作の指示がなされても、前記動作中の動作を終了して後に前記他の動作を開始することを特徴とするプリンター付撮影装置。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】本発明は複合カメラ、より具体的には銀塩写真フィルムを使用したスチルカメラと画像プリンターを一体的に構成可能としたプリンター付撮影装置に関するものである。
【０００２】
【従来の技術】従来から、撮影したその場で写真プリントを見たいという声があった。これらに対して米国特許３，７０９，１２２号、３，７２７，５２９号、４，０００，５００号、４，２４９，８１１号、４，２１２，５２４号等の装置や同じく米国特許３，７０７，１１６号のフィルムカートリッジ等いわゆるインスタントカメラ及びインスタントフィルムによって撮影後短い時間でプリントが鑑賞できるシステムが開示されている。
【０００３】しかしながら上記従来例の装置においては以下の様な問題点を有していた。
【０００４】（１）撮影された瞬間の画像はすべてインスタントフィルム上に記録されるのみであり、銀塩フィルム等に代表される保存性に優れ、かつ高画質の記録媒体に残しておくことができない為、特に複数枚のプリントを得ようとしても、インスタントフィルム上に形成された画像をコピーするしかなく、その原画の保存方法等、銀塩フィルム等に比べて不便である。
【０００５】（２）すべての撮影シーンがその場でプリントアウトする必要性が高いとは限らない。しかしインスタント写真ではその場ではプリントアウトはしないで後でまとめてプリントアウトするといったことができない。
【０００６】このようなインスタント写真の欠点を補う方法として、固体撮像素子に撮像した画像情報を、銀塩フィルムに露光する等とほぼ等価なタイミングでメモリに取り込んで、これを任意にプリントアウトする様にしたプリンター付カメラが考えられる。
【０００７】こうしたカラーの画像情報をプリントアウトするのに用いられるプリンターは一般的に、
ａ）溶融型熱転写プリンター
ｂ）昇華型熱転写プリンター
ｃ）インクジェット型プリンター
等が適している。
【０００８】この中でもインクジェット型プリンターはランニングコストや小型化、省電、出力スピード等に優れており、携帯性を必要とするプリンター付カメラとして大変有効なものである。
【０００９】これらの一例として米国特許４，０７４，３２４号、特開昭５４－１３６３２５号公報等の装置においては、固体撮像素子等によって電気的に撮像した情報をプリントアウトするプリンター付カメラが開示されている。このプリンター付カメラにおいては、被写界の光学像を作る対物レンズを含む光学系と、光学像を赤、緑、青色に分解する色分解器と、この光学像を電子像信号に変換する感光トランスデューサと、この電子像信号をデジタル信号に変換するＡ／Ｄ変換器と、これを記憶するメモリと、メモリのデジタル信号をアナログ信号に変換するＤ／Ａ変換器と、このアナログの電子像信号を可視できるよう表示する電子的光学表示装置と、上記アナログの電子像信号を磁気テープ等に記録する磁気記録再生装置と、磁気テープからの電子像信号を受けて受像紙上に像のプリントを作るプリンタと、上記各部を制御する制御用論理システムとから構成されることを示している。
【００１０】
【発明が解決しようとする課題】しかしながら、上記従来例では、静止画を撮影する装置紙等の媒体に画像情報を出力するプリンターを一体的に構成したことによる操作性の複雑化を防止したり、装置の構成やコスト等使用

者が簡単に意図した撮影及びプリント出力を行なうのに充分な解決方法を与えるものではなかった。

【００１１】今、プリンター装置の電力消費を考えると、昇華型熱転写プリンターの場合にはインクシートの材料を記録用ヘッドの熱によって直接的に気化させて記録用紙へ転写する必要があるのと、一般的に記録するプリントの幅全体の長さの記録ヘッドに略同時にエネルギーを投入すること等から非常に大きな電力を必要とする。

【００１２】一方これに比べ溶融型熱転写プリンターの場合には、インクシートの材料を液化させて記録用紙へ転写するのと、記録するプリントの幅に対して用紙の送り方向にある幅だけを記録する動作を繰り返すものが多く、一般的に昇華型熱転写プリンターに比べると消費される電力は少ない。又インクジェット型プリンターは液体であるインクを記録ヘッドで発泡させてノズルより飛ばすものであり、これも昇華型熱転写プリンターに比べると消費される電力は少ない。

【００１３】しかしいずれの場合も、連続して記録ヘッドにエネルギーを投入して用紙へ記録する為に、プリント動作中には電源電圧が安定していなければならない。又、逆にプリント動作中に装置の電源から他の機能を行なう為に電力を供給すると、電圧の変動等によって他の機能が達成できなくなるケースも考えられる。

【００１４】ここでプリンター付撮影装置において、プリント動作中の撮影装置のストロボ発光部を考える。

【００１５】ストロボ発光部は、周知の通り発光体にＸｅ管（キセノン管）等を用いて電気エネルギーを与えて発光させ、暗い被写体に照射して撮影するものである。このストロボ発光部は一般的に電源電圧を発振回路及び昇圧回路等を用いて２６０Ｖ以上、フル充電で３００Ｖから３６０Ｖ程度にメインコンデンサーを充電し、これをトリガー回路によって撮影装置の露光時間内に放電・起爆させ、Ｘｅ管を発光させることでストロボ発光動作を行なっている。

【００１６】そして１つのストロボ発光を伴なう撮影動作が完了すると、次の充電動作が開始し充電完了と共に次の撮影が可能になる。

【００１７】しかし、この時プリンター装置がプリント動作を行なっていると、ストロボ充電による電源電圧の変動や不安定さによって、プリント動作中の記録ヘッドへのエネルギーの投入が適正に行なえずに欠陥の生じた部分を有する不良プリントになる可能性があった。

【００１８】また、ストロボ発光を伴なう撮影が行なわれた後のストロボの充電動作中にプリント動作を開始しようとした時には、撮影装置とプリンター装置の両方に電力を供給しようとすると、上記と同様に不良プリントが生じる可能性がある。又、一時的に充電をストップさせると、ストロボの充電動作に要する時間がプリントアウト後にも必要になり、次の撮影がすぐに行なえないという問題点もあった。

【００１９】本発明はこれらの問題点を考慮してなされたものであり、第１の目的としては、プリンター装置がプリント動作中にストロボ発光部のメインコンデンサーの充電によるプリンター装置のプリント不良を無くした装置を提供することにある。

【００２０】また、第２の目的としては、プリント動作を行なうことでストロボ充電に余分な時間がかかって次の撮影までに待ち時間が増えてしまうことのない装置を提供することにある。

【００２１】

【課題を解決するための手段】上記の目的を達成する為に、本発明によれば、映像情報を記録媒体に記録するストロボ発光部を有する撮影装置と、映像情報を記録用紙に出力するプリンター装置とを一体的に構成可能にしたプリンター付撮影装置において、撮影装置のストロボ発光部の動作をプリンター装置の動作中に制御する制御手段を有し、該制御手段はプリンター装置がプリント出力動作中にはメインコンデンサーへの充電動作を停止するものである。

【００２２】これによれば、プリント出力中はストロボの充電を行なわない様に動作し、プリントが終了した後に充電を開始するので、所定に品質のプリントを得ることができ、メインコンデンサーへの充電も急速充電で充電待ち時間を短くできる。

【００２３】又本発明によれば、プリンター装置のプリント動作を撮影装置のストロボ発光部の動作中に制御する制御手段を有し、制御手段はメインコンデンサーへの充電動作中にプリント動作を開始させた場合には、メインコンデンサーへの充電が完了するまでプリント動作を停止するものである。

【００２４】これによれば、ストロボの充電中にはプリント開始しないように動作し、電池電源そのもので急速充電が可能で、プリントもこの低下のない電池電源の状態で可能となるので、所定の品質で出力できる。

【００２５】更に、本発明のプリンター付撮影装置は、プリンター装置のプリント動作と撮影装置のストロボ発光部の動作とを制御する制御手段を有し、該制御手段はプリント動作終了とストロボ発光部の動作終了とを観察し、いずれかの動作の動作中に他の動作の指示がなされても、動作中の動作を終了して後に他の動作を開始することを特徴とする。こうして、個々の動作目的であるプリントアウト及びフラッシュとを個々に完遂できる。

【００２６】

【発明の実施の形態】以下、本発明の実施の形態について、実施例とともに図面を参照しつつ詳細に説明する。

【００２７】（第１の実施例）図１乃至図５において本発明による第１の実施例について説明する。図１は本発明を適用するプリンター付カメラが適用されるインクジェット記録装置部ＩＪＲＡ（Ink Jet Recorder Assembl

y）の概念図で、図2は本発明を適用できる複合カメラの中央断面の概念図である。また図3は本発明によるプリンター付カメラ装置の主たる構成を表わしたブロック図であり、図4及び図5は動作の流れを示すフローチャートである。

【００２８】本実施例の装置はスチルカメラとこのスチルカメラで撮像した画像をプリントアウトする複合カメラの例を示し、プリンターエンジン部にインクジェット記録方式を採用し、スチルカメラ部に銀塩フィルムを用いた装置を採用している。

【００２９】図1はプリンター付カメラの外観図で、特にプリンタエンジン部6の部分を詳細に図示している。図において、１２はシャッターボタン、１３はプリントボタン、5は撮像部、１１はストロボ発光部、ＩＪＲＡはインクジェット記録装置部である。この外観図から、撮像部5は1眼レフ式カメラの例を示し、シャッターボタン１２を押すことでスチルフィルムに露光し、プリントボタン１３を押してインクジェット方式のフィルムを複数枚プリントアウトすることができる。

【００３０】図2は本実施例の複合カメラの中央断面の概念図である。本実施例の複合カメラにおけるスチルカメラ部は、撮影光学系と別に被写体を視認するファインダーを有するいわゆる2眼レフ式カメラをプリンター部の上部に配置し、スチルカメラ部とプリンター部の間にプリンター画像形成用の固体撮像素子を用いた第2の撮像光学系を配置したものである。

【００３１】スチルカメラ部は、沈胴型の2段式の鏡筒１０２９及び１０３０について各々撮影光学系のレンズユニット１０２８ａ及び１０２８ｂが配置されている。１０３１は撮影光束を制御すると共に露光量の制御を兼用するシャッターユニットであり、鏡筒１０２９に配置されている。１０３２は鏡筒１０３０を回動させるヘリコイド部材であり、鏡筒１０３０のカム凸部１０３０ａと係合している。該ヘリコイド部材１０３２は不図示のヘリコイド駆動モーターによって、図上鏡筒１０３０を左右に駆動され、焦点を合わせる。

【００３２】上記した撮影光学系１０２８ａ及び１０２８ｂならびにシャッターユニット１０３１を通った光束はフィルム１０３３上に結像する。

【００３３】フィルム１０３３はその平面性を保つ為に、圧板バネ１０３５によって付勢された圧板１０３４に押圧されて、光学的な位置関係を保っている。１０３６はスチルカメラ部の背蓋であり、フィルム１０３３の交換等の際に開閉される。

【００３４】また、１０３７ａ，１０３７ｂ，１０３７ｃ，１０３７ｄ，１０３７ｅはファインダーを構成する光学系のレンズである。これらのうち１０３７ｂ，１０３７ｃ，１０３７ｄは撮影光学系の画角調整（ズーム操作）に伴なって移動し、撮影光学系の画角と略同じ画角を確認することができる。

【００３５】さらに、１０３８ａ及び１０３８ｂはプリンター部に画像情報を送出する為の画像形成用撮像光学系のレンズユニットである。

【００３６】又、１０３９は絞りユニットであり、固体撮像素子（ＣＣＤ）１０４０の露出量をフィードバック制御によって適正に保つ様に駆動される。

【００３７】これらのレンズユニット１０３８ａ及び１０３８ｂもスチルカメラ部の撮影光学系の画角調整（ズーム操作）に伴なって移動し、撮影光学系の画角と略同一の画角を撮像することができる。特に、スチルカメラによる画像とプリントする画像とを一致させる場合には、同一画角となるように連動させておく必要がある。

【００３８】プリンター画像形成用の固体撮像素子１０４０からの画像信号は信号処理基板１０２６で処理される。信号処理基板１０２６で信号処理が行なわれてプリンターの制御信号が生成されると、その信号はプリンター制御基板１０２７へ送出され、プリンター部のインクジェットヘッドカートリッジ４００の位置制御信号等の情報と合わせて印刷動作に必要な駆動モーター等へ供給される。

【００３９】プリント動作はプリント開始ボタン１３－ｂによって開始され、ロール状に巻かれたプリンター用紙１０２４からプラテン１０００を介してプリンター用紙１０２４ａが引き出され印刷される。

【００４０】また、１０４１は外装のカバーで形成された紙カッター部であり、印刷後のプリント部を手で切り離す際に用いられる。

【００４１】又、１０２５はプリンター部及び撮影装置を駆動する為の電源電池であり、両者に対して共通に電力を供給する。

【００４２】以下、プリンタ部のインクジェット記録装置部ＩＪＲＡについて、詳述する。図1を用いて、プリンタ部について説明する。ここで、プリンタ紙を露光後外部に排出するキャリッジＨＣは、駆動モーター１０１３の正転逆転に連動して駆動力伝達ギヤ１０１１及び１００９を介して回転するリードスクリュー１００４の螺旋溝１００５に対して係合するピン（不図示）を有し、インクジェットヘッドカートリッジ４００をキャリッジＨＣを介して矢印ａ又はｂ方向に往復移動される。

【００４３】キャリッジＨＣにはインクジェットヘッドカートリッジ４００が装着される。１００２は紙押え板であり、キャリッジの移動方向にわたって紙をプラテン１０００に対して押圧する。１００７，１００８はフォトカプラーであり、キャリッジＨＣのレバー１００６のこの領域での存在を確認してモーター１０１３の回転方向切り替え等をおこなうためのホームポジション検知手段である。１０１６は記録ヘッドの前面をキャップするキャップ部材１０２２を支持する部材、１０１５はこのキャップ内を吸引する吸引手段であり、キャップ内開口１０２３を介して記録ヘッドの吸引回復を行なう。

【００４４】また、１０１７はクリーニングブレード、１０１９はこのブレード１０１７を前後方向に移動可能にする部材であり、本体支軸板１０１８にこれらは支持されている。ブレード１０１７はこの形態でなく周知のクリーニングブレードが本例に適用できることはいうまでもない。

【００４５】また１０１２は、吸引回復の吸引を開始するためのレバーであり、キャリッジＨＣと係合するカム１０２０の移動に伴って移動し、駆動モーターからの駆動力がクラッチ切り替え等の公知の伝達手段で移動制御される。

【００４６】これらのキャッピング、クリーニング、吸引回復はキャリッジＨＣがホームポジション側領域に位置づけられたときにリードスクリュー１００５の作用によって、それらの対応位置で所望の処理が行なえるように構成されているが、周知のタイミングで所望の動作を行なうようにすれば、本例にはいずれも適用できる。

【００４７】次に、本実施例によるプリント付カメラの制御関係について図３を参照しつつ説明する。図において、１はカメラ部とプリント部及びストロボ部分などを総合的に制御する制御手段、２はカメラ部を制御手段１の指示により露光時間、絞り度合い、フォーカス位置等について制御するカメラ制御部、３はカメラ制御部２の画像情報に従って、光学レンズ１０２８，鏡筒１０２９，１０３０等を含んで、銀塩フィルム１０３３に露光するカメラ部、１１はカメラ部３の動作に応じて、シャッター動作とともに発光するメインコンデンサーを内蔵したストロボ発光部である。また、４は制御手段１の制御信号の指示に従ってプリントするプリンタなどを制御するプリンタ制御部、５はプリンタ用画像を読み取る、光学レンズ１０３８，絞りユニット１０３９、光電変換するＣＣＤ１０４０等を含む撮像部、６はインクジェットプリンタＩＪＲＡを含むプリンタ部をドライブするプリンタエンジン部であり、メモリに内蔵された画像信号をプリントアウトする。また、１０は撮像部５から得られた光電子像信号をデジタル信号で記憶するメモリ部である。

【００４８】次に、本実施例による図１に示すブロック図を基に、図４，図５のフローチャートを参照しつつ、作用動作の手順に従って説明する。

【００４９】撮影者がメインスイッチ電源を入力する（Ｓ１）と、制御手段１は該装置が前回使われて、電源がオフされてから３日以上（７２時間以上）経過しているか否かを判断する（Ｓ２）。もしも３日以上経過している場合には、制御手段１はプリンター部の制御を受け持つプリンター制御部４に回復ポンピングの指示を出してプリンターエンジン部６を駆動する（Ｓ３）。

【００５０】ここで回復ポンピングは、後述するインクジェット記録方式の装置において、より記録を有効にするものであって、プリント用紙への記録を行なう事前にインクジェットヘッドカートリッジ４００の記録ヘッドを吸引ポンプ等の手段によってクリーニングするものである。このクリーニングの目安として、本実施例においては３日間以上の未使用期間があった場合に電源入力時にこれを行なうものとした。

【００５１】さて撮影者は撮影に際してシャッターボタン１２を第１ストロークまで押し込むと、不図示の接点が導通しＳＷ１信号７が発生する（Ｓ４）。

【００５２】これによって制御手段１はカメラ制御部２を介してカメラ部３を駆動し、露出制御値の決定や測距情報の決定、ストロボ発光の有無等露出動作に必要な諸条件の決定を行なう（Ｓ５）。

【００５３】これと同時に制御手段１はプリンター制御部４を介して撮像部５を駆動し、撮像部５の固体撮像素子１０４０に入力する光量を適正に保つ様に絞りユニット１０３９を制御し、プリントアウトする為の画像情報の撮像条件を決定する（Ｓ６）。

【００５４】次に撮影者が実際に撮影を実行する為に、更にシャッターボタン１２を押し込むと、不図示の接点が導通しＳＷ２信号８が発生する（Ｓ７）。

【００５５】これによって制御手段１はカメラ制御部２を介してカメラ部３を駆動して焦点合わせの為のレンズ駆動やシャッターの速度制御、絞りの開口量制御、又必要であればストロボの発光等の一連の露光動作を行なう（Ｓ８）。

【００５６】ストロボの発光はカメラ制御部２によるシャッターの開口時間中に発生するＸ接点信号によって行なわれ、露出制御値をコントロールする受光センサー（不図示）が露出適正と判断すると、制御手段はストロボ発光部１１の発光動作を停止する（Ｓ９）。

【００５７】これと同時に制御手段１はプリンター制御部４を介して撮像部５を駆動し、固体撮像素子１０４０に入力している画像情報をメモリ部１０に取り込む（Ｓ１０）。

【００５８】この後撮影者がシャッターボタン１２を離すと、フィルムの巻き上げを行なう（Ｓ１１）。

【００５９】撮影者がプリントアウトしない場合はプリントボタン１３－ａでプリントしない方（ＮＯ）を選択することで制御手段１はカメラ制御部２を介してストロボ発光部１１のメインコンデンサーに充電動作を開始させる。

【００６０】一方プリントアウトを望む場合には、装置上面に配設されたプリントボタン１３－ｂでプリントする側（ＹＥＳ）を押すと、不図示の接点が導通しプリント信号ＰＲ９が発生する。

【００６１】これを受けて制御手段１はプリンター制御部４を介してプリンターエンジン部６を駆動してプリント動作を行なう。

【００６２】ここでプリンター制御部４はインクジェットヘッドカートリッジ４００の記録ヘッドのホームポジ

ション位置でプリント動作をより有効にする為にまず予備吐出を行ない、記録ヘッド４００の目づまりを解消したり、蒸発しているノズルの回復等を行なう（Ｓ１４）。

【００６３】次にプリンター制御部４はメモリ部１０に蓄えられた画像情報をプリンター出力用の画像処理を加えた上でプリンターエンジン部６から出力する。画像処理は誤差拡散法等が有効である（Ｓ１５）。

【００６４】所定のプリント動作が終了すると、プリンターエンジン部６でプリントされたプリント用紙１０２４ａはロール状に巻かれたプリント用紙１０２４と切り離される位置まで自動的に給紙される（Ｓ１６）。

【００６５】このプリンター用紙１０２４ａを切ることで、撮影者はスチルカメラ部へのフィルム露光と共にほぼ同一の画像をプリント出力としてその場で得ることができる。

【００６６】その後、制御手段１はカメラ制御部２を介してカメラ部３のストロボ発光部１１のメインコンデンサーへの充電を開始する。

【００６７】これによって電源電池がプリント動作とストロボの充電を同時に実行して電圧降下を起こすということが無く、プリント出力を確実に行なえる。また、ストロボ発光部１１のメインコンデンサーへの充電も電源電池によりフル充電が可能となる。

【００６８】なお、本実施例は、特にインクジェット記録方式の中でも、インク吐出を行わせる為に利用されるエネルギーとして熱エネルギーを発生する手段（例えば電気熱変換体やレーザ光等）を備え、前記熱エネルギーによりインクの状態変化を生起させる方式の記録ヘッドや記録装置において優れた効果をもたらすものである。

【００６９】上記インクジェット方式記録装置について、その代表的な構成や原理については、例えば、米国特許第４，７２３，１２９号明細書、同第４，７４０，７９６号明細書に開示されている基本的な原理を用いて行なうものが好ましい。この方式は特にオンデマンド型の場合には液体（インク）が保持されているシートや液路に対応して配置されている電気熱変換体に、記録情報に対応していて核沸騰を越える急速な温度上昇を与える少なくとも一つの駆動信号を印加することによって、電気熱変換体に熱エネルギーを発生せしめ、記録ヘッドの熱作用面に膜沸騰させて、結果的にこの駆動信号に一対一対応し液体（インク）内の気泡を形成出来るので有効である。この気泡の成長、収縮により吐出用開口を介して液体（インク）を吐出させて、少なくとも一つの滴を形成する。

【００７０】この駆動信号をパルス形状とすると、即時適切に気泡の成長収縮が行なわれるので、特に応答性に優れた液体（インク）の吐出が達成でき、より好ましい。

【００７１】このパルス形状の駆動信号としては、米国特許第４，４６３，３５９号明細書、同第４，３４５，２６２号明細書に記載されているようなものが適している。尚、上記熱作用面の温度上昇率に関する発明の米国特許第４，３１３，１２４号明細書に記載されている条件を採用すると、更に優れた記録を行なうことができる。

【００７２】記録ヘッドの構成としては、上述の各明細書に開示されているような吐出口、液路、電気熱変換体の組み合わせ構成（直線状液路又は直角液流路）の他に熱作用部が屈曲する領域に配置されている構成を開示する米国特許第４，５５８，３３３号明細書、米国特許第４，４５９，６００号明細書を用いた構成も本発明に含まれるものである。

【００７３】加えて、複数の電気熱変換体に対して、共通するスリットを電気熱変換体の吐出部とする構成を開示する特開昭５９－１２３６７０号公報や、熱エネルギーの圧力波を吸収する開孔を吐出部に対応させる構成を開示する特開昭５９－１３８４６１号公報に基づいた構成としても本実施例は有効である。

【００７４】更に、記録装置部が記録できる最大記録媒体の幅に対応した長さを有するフルラインタイプの記録ヘッドとしては、上述した明細書に開示されているような複数記録ヘッドの組み合わせによって、その長さを満たす構成や、一体的に形成された一個の記録ヘッドとしての構成のいずれでも良いが、これらの構成をとることで本発明を一層有効に発揮することができる。

【００７５】加えて、装置本体に装着されることで、装置本体との電気的な接続や装置本体からのインクの供給が可能になる交換自在のチップタイプの記録ヘッド、あるいは記録ヘッド自体に一体的に設けられたカートリッジタイプの記録ヘッドを用いた場合にも本発明は有効である。

【００７６】又、本発明の記録装置部の構成として設けられる。記録ヘッドに対しての回復手段、予備的な補助手段等を付加することは、本発明の効果を一層安定できるので好ましいものである。

【００７７】これらを具体的に挙げれば、記録ヘッドに対しての、キャッピング手段、クリーニング手段、加圧或いは吸引手段、電気熱変換体或は、これとは別の加熱素子或はこれらの組み合わせによる予備加熱手段、記録とは別の吐出を行なう予備吐出モードを行なうことも安定した記録を行なうために有効である。

【００７８】更に記録装置部の記録モードとしては黒色等の主流色のみの記録モードだけでなく、記録ヘッドを一体的に構成するか複数個の組み合わせによってでもよいが、異なる色の複色カラー又は、混色によるフルカラーの少なくとも一つを備えた装置であることが極めて有効になる。

【００７９】（第２の実施例）図６乃至図１１において本発明の第２の実施例を説明する。なお第１の実施例と同じ動作を行なう個所については同一の符号を付け、説

明は省略する。

【００８０】本第２の実施例の装置は、プリンター部で印刷する為の画像情報を得る撮像素子を、銀塩フィルムに結像する撮影光学系から分光した光路上に配置することで、銀塩フィルム上に記録される画像とほぼ同画角の画像情報を得ることができる形態のものである。

【００８１】この装置によれば、銀塩フィルム上に記録された画像を現像後にプリント処理したものとほぼ同じ画角のプリント出力を得られるので、より銀塩写真プリントに近いイメージのプリントを即座に入手できるものである。

【００８２】この装置において、ストロボ充電中のプリンター装置のプリント動作の停止について説明する。

【００８３】図６は本第２の実施例による複合カメラの機能を説明するための左側側面図で、同図において、２００１は本装置を構成する外装カバーであり、ネジ等の締結部分等により、複数部品からなる。２００２は銀塩フィルムに像を取り込むためのレンズユニット、２００３はレンズユニットを構成し、レンズエレメントを保持するための鏡筒、２００４は銀塩スチル撮影用の光彩絞り、２００５は銀塩フィルムである。本実施例においてレンズユニット２００３はズームレンズを構成しており、自動若しくは手動のズーム操作に連動して、光軸上を移動可能な変倍レンズエレメント群、および後述する自動焦点調節装置からの情報により駆動される合焦レンズエレメント群を有している。

【００８４】また、２００６は銀塩フィルムの直前に配置されるシャッター装置で、２００６ａのシャッター膜や２００６ｂのシャッターフレーム等で構成される。２００７は被写体からの画像をそれぞれ銀塩フィルム側とビデオ撮像素子側に振り分けるための半透明薄膜ミラー、２００７ａは被写体側から入光される光軸、２００７ｂは前記半透明薄膜ミラー２００７を透過して銀塩フィルム側に到達する光軸、２００７ｃは前記半透明薄膜ミラー２００７によって反射された光軸及び２００７ｄは反射ミラー２００９によって反射された光軸を示す。２００８ａ，２００８ｂは光軸２００７ｃ上に設けられて被写体像の瞳合わせを行う為のフィールドレンズ、２００９は撮影光軸２００７ｃを偏向するための反射ミラー、２０１０は光軸２００７ｄ上に設けられた縮小レンズユニットで、なかにビデオ同画撮影用のビデオ絞りユニット２０１１を含む。２０１２は光学ローパスフィルター、２０１３はＣＣＤなどの固体撮像素子である。２０１４は銀塩フィルム２００５の結像位置と等価な位置に半透明薄膜ミラー２００７で分光した光束が結像された空中像を表すサブミラーであり、これを一次結像面として前記縮小レンズユニット２０１０によって固体撮像素子２０１３上に再結像される。

【００８５】また、サブミラー２０１４は前記半透過薄膜ミラー２００７の後方で撮影時退避可能なサブミラーであり、撮影光の一部を自動焦点検出装置２０１５へと導光する。本実施例における自動焦点検出装置２０１５は、いわゆる位相差ズレ検出方式を採用し、撮影レンズの異なる複数領域を通過した光束により生じる複数像を比較して、フィルム面２００５上でのデフォーカス量と方向を検知する。なお、常時、前記固体撮像素子２０１３上には被写体像が得られているので、該固体撮像素子からの高周波映像信号に基ずいてボケ方式の自動焦点調節を行っても良く、又本実施例のズレ方式との複合方式でも良い。

【００８６】又、２０１６は前記半透明薄膜ミラー２００７を使用するがゆえに、光線漏れを防ぐために撮影時、退避可能な遮光板である。

【００８７】さらに、２０１７は銀塩フィルム２００５を装填する時に開閉自在に設けられた背蓋ユニットである。本実施例では１３５タイプの銀塩フィルムを用いているが、これに限る必要はなく、ドロップインタイプのものや円盤タイプ等のフィルムであっても何等さしつかえない。

【００８８】また２０１８は電子ビューファインダーユニットで、前記固体撮像素子２０１３からの映像信号をモニタするために、映像を小型液晶表示器２０１９に出力し、反射ミラー２０２０と接眼レンズ２０２１を介して観察する。該ビューファインダーユニットは回転軸２０２２を支軸として回動可能となっている。

【００８９】同図のかかる構成において、通常、銀塩スチル撮影用の光彩絞り２００４は常に開放状態に維持され、後述する銀塩スチル撮影用のレリーズスイッチが押し込まれた時に所定の径まで絞りこまれる。又、プリンター出力用画像の取り込み時には、縮小レンズユニット２０１０の中のビデオ絞りユニット２０１１も露出制御され、必要に応じて撮像素子の蓄積時間や信号処理系のゲインを変えて適正露光を得る。

【００９０】また、２０２３は本装置の下部に脱着可能に取り付けられる２次電池で、本装置の全ての使用電力を供給する共通単一電源である。レンズユニット２００３の前方にはストロボ２０２４を組み込んだ開閉自在のバリヤ２０２５を配設する。また２０２７はテレビやステレオ装置等の外部装置とのインターフェスとしての外部端子である。

【００９１】つぎに、図７は本実施例の上面図である。図において、２００１は本装置の外装カバー、２０１８は電子ビューファインダーユニット、２０２８は銀塩フィルム２００５のパトローネ室であり、２０２９は該フィルムを巻きとるためのスプールである。本実施例ではフィルム装填時にあらかじめ最終駒までをスプールに巻き上げ、撮影時には露光済みの駒を順次巻き戻していくプリワインド方式を採用している。

【００９２】また、２０３０，２０３１は撮影レンズのズーム駆動用モーターとフォーカス駆動用のモーターで

ある。２０３２は撮影使用者の右手にて操作可能な位置に配置されたズームボタンであり、２０３３は電源スイッチを兼ねた主モード選択スイッチであり、２０３４はプリント出力開始のプリントボタン、２０３５は銀塩撮影時に使用可能なスチル用シャッターボタンである。

【００９３】上記操作部材とともに、その反対側には、プログラム露出モードや開放絞り多用のポートレートモード、シャッター速度優先のスポーツモード、逆光モード等選択使用可能なモード選択ダイヤル２０３６を配設する。

【００９４】測光は上記各種モードに対応して、前記固体撮像素子２０１３の輝度信号レベルに応じてフィードバック制御される。本実施例ではプリンター用の撮像素子２０１３を電気的にエリア分割して測光素子として兼用しているが別途専用の測光素子を配置しても良い。

【００９５】また、２０３７はレンズユニット２００２の右側方に配置されたプリンターエンジンユニットであり、本実施例では第１の実施例と同一の構成であるインクジェット記録装置を使用しているがこれに限られたものではない。

【００９６】その上面にはプリントの画質調整や濃淡等を制御するためのコントロールパネル２０３８、用紙の排出を指示するための排出ボタン２０３９等が配置される。

【００９７】図８は本実施例によるプリンター付カメラのインクジェット記録装置部ＩＪＲＡの外観図である。図１に示した構成とほぼ同一であり、携帯用としてプリンター用紙のサイズ、キャリッジＨＣなどのサイズ、重量などを小型、軽量化されている。図８において、２０４０はプリンターエンジンユニット２０３７を覆う外装カバーであり、プリンター用紙２０４１の交換やインクジェットヘッドカートリッジ４００の交換等に用いられる。

【００９８】図９及び図１０は本第２の実施例の装置の動作の流れを示すフローチャートであり、ストロボ充電時の動作について説明する。

【００９９】上述の複合カメラの構造において、スチルカメラによる銀塩フィルム２００５への撮像と、プリンタ部による複数枚のプリント出力を行なう際、ストロボ発光のためのメインコンデンサへの充電とプリント出力動作とが同時に発生する場合があり、その時の撮影動作に関わる構成は図３に示す第１の実施例によるブロック図と同様であり、またその動作は図４に示すフローチャートによるステップＳ１～Ｓ１１まではほぼ同じであり、説明を省略する。

【０１００】本第２の実施例の装置においては、プリント動作の開始を指示するプリントボタン２０３４はプリント出力する場合のみ使用する様になっている。撮影装置はストロボ発光が終了し（Ｓ９）、フィルムの給送動作（Ｓ１１）が完了すると、続いてストロボの充電動作を行なう様に構成されていて、次の撮影への準備が素早く行なえるようにする。

【０１０１】図９において、制御手段１はカメラ制御部２を介してフィルムの給送が完了し、フィルム巻上げ駆動モーター（不図示）の駆動を停止させると、ストロボの充電動作を開始する（Ｓ２１）。

【０１０２】図１１はストロボ回路の構成を示したものであり、ＴＲはトランジスタ、Ｒは抵抗、Ｃはコンデンサー、Ｄはダイオードを表わしている。この図において、制御手段１はカメラ制御部２を介して充電スイッチ２００をオンすると、電源電池BATTから電源がトランジスタTRS1に供給され、発振トランスT_1 ２０１によって発振、昇圧を行なう。この昇圧電圧をD_{S1}２０３に通した後、メインコンデンサC_{S2}２０２には通常フル電圧約３６０Ｖによって充電され、同時に充電中を示すネオン管の表示器Neを点灯し、充電を完了する。充電を完了すれば、充電スイッチはオフとなり、メインコンデンサC_{S2}２０２が充電された状態を表示器Neで点灯しつつ、カメラ制御部２のトリガー信号により、トランスT_2を介してストロボランプのキセノン管Xeをオンして、メインコンデンサC_{S2}２０２からの蓄電量に従って発光させ放電する。

【０１０３】本実施例においては充電の開始から発光に十分に足りる電圧（約２６０Ｖ）にコンデンサーC_{S2}２０２が充電されるまで、電源電圧が十分に高い場合には約４秒程度かかり、フルに充電される電圧（約３６０Ｖ）になるまでは約６秒程度の時間を要する。逆に電源電圧が禁止電圧近くに低い場合は１０秒以上要する場合もある。

【０１０４】この充電動作中に撮影者がプリントボタン２０３４を押すと（Ｓ２２）、制御手段１は発光に十分に足りる電圧（約２６０Ｖ）以上であり、かつ多少のマージン余裕を見た充電基準電圧（本実施例では約２６５Ｖ）以上になるまで充電を継続した後（Ｓ２３）、充電を停止してプリント動作に入る（Ｓ２４）。ここで、充電基準電圧以上となったか否かは、コンパレータ２０６によって、充電電圧が充電基準電圧以上か否かを制御手段で判断する。以降、プリント動作は第１の実施例と同じである（Ｓ２５～Ｓ２７）。

【０１０５】この様に動作することで、次の撮影がプリントアウト直後から行なえると共にフル充電せずに必要かつ十分な充電で充電動作を停止することで、プリント開始までの待ち時間を最小限にとどめることが可能になっている。

【０１０６】

【発明の効果】以上説明したように、本発明によれば、プリンター装置が動作中には撮影装置のストロボ発光部のメインコンデンサーへの充電動作を停止することで、プリンター装置に対して安定して電力供給が行なえ、プリント動作不良が無いという効果を有している。

【０１０７】又本発明によれば、撮影装置のストロボ発光部のメインコンデンサーへの充電動作中にプリント出力開始が指示された時は充電動作が完了するまでプリント動作を停止することで、次の撮影がプリントアウト直後にすぐ行なえるという効果を有している。

【０１０８】さらに本発明によれば、ストロボ発光部のメインコンデンサーの充電とプリンター装置のプリントアウトのいずれか速く動作を開始した場合には、他の動作の指示があっても、１つの動作を完了してから次の動作を開始することとしたので、いずれの動作をも完遂できる。

【図面の簡単な説明】

【図１】本発明による第１の実施例のプリンタ付撮像装置の外観図及びインクジェット記録装置の構成である。

【図２】本発明による第１の実施例の中央断面図である。

【図３】本発明による第１の実施例のブロック図である。

【図４】本発明による第１の実施例のフローチャート図である。

【図５】本発明による第１の実施例のフローチャート図である。

【図６】本発明による第２の実施例のプリンタ付撮像装置の左側側面図である。

【図７】本発明による第２の実施例の上面図である。

【図８】本発明による第２の実施例の斜視図である。

【図９】本発明による第２の実施例のフローチャート図である。

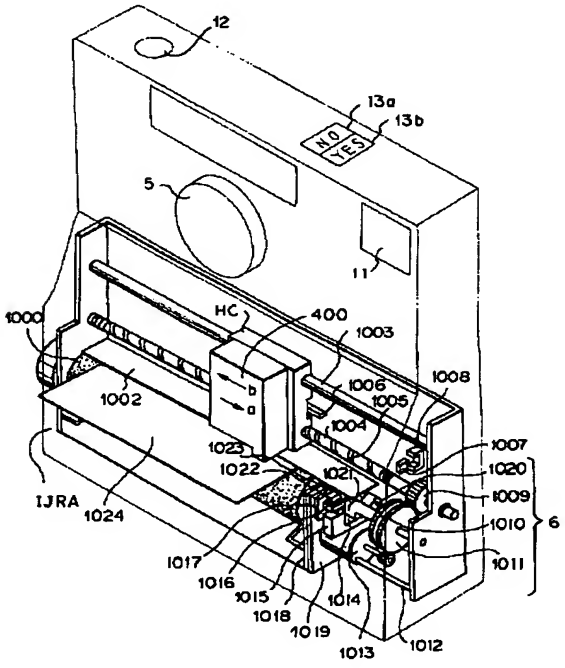
【図１０】本発明による第２の実施例のフローチャート図である。

【図１１】本発明による第２の実施例のストロボ回路図である。

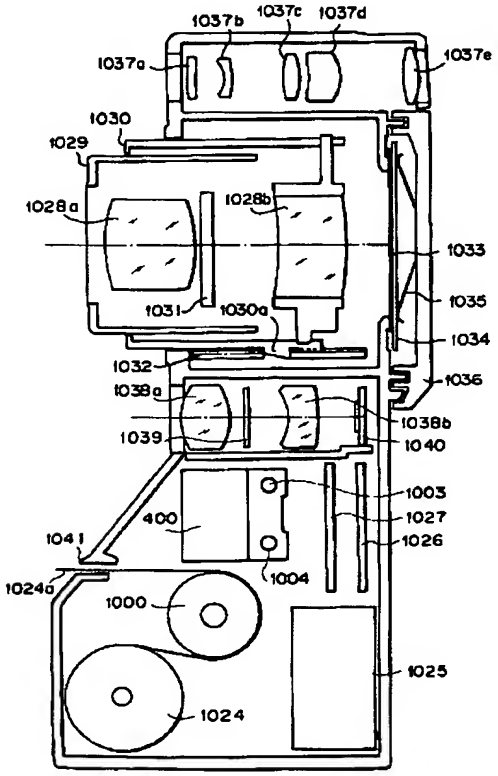
【符号の説明】

１　制御手段
２　カメラ制御部
３　カメラ部
４　プリンター制御部
５　撮像部
６　プリンターエンジン部
７　ＳＷ１信号
８　ＳＷ２信号
９　プリント信号
１０　メモリ部
１１　ストロボ発光部

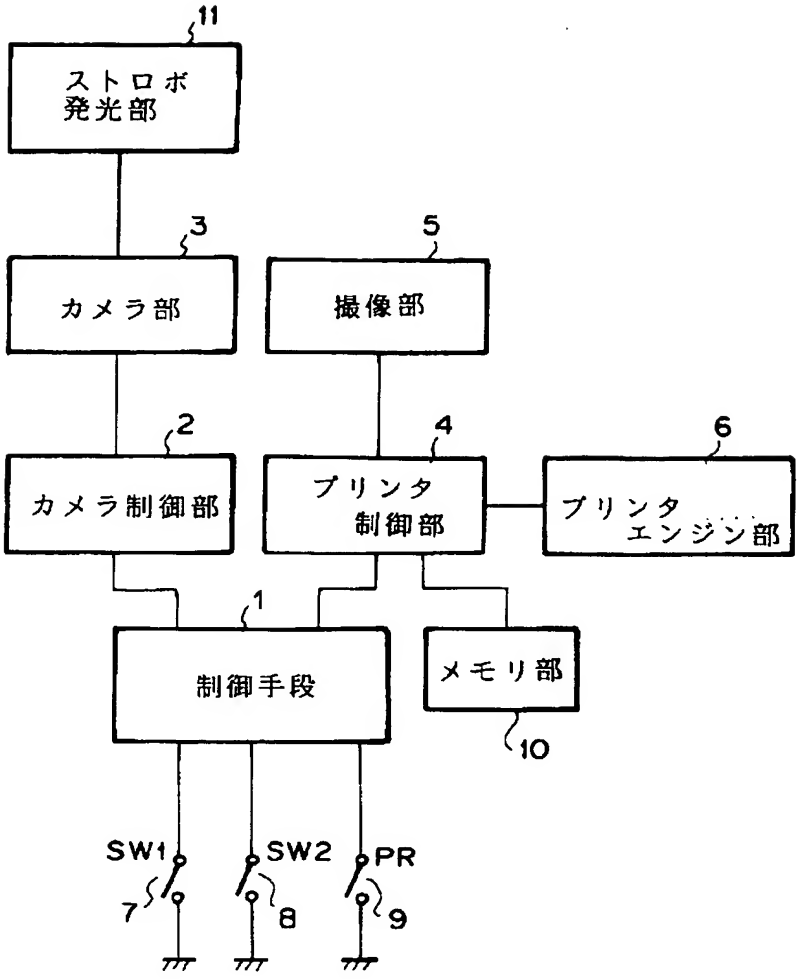
【図１】



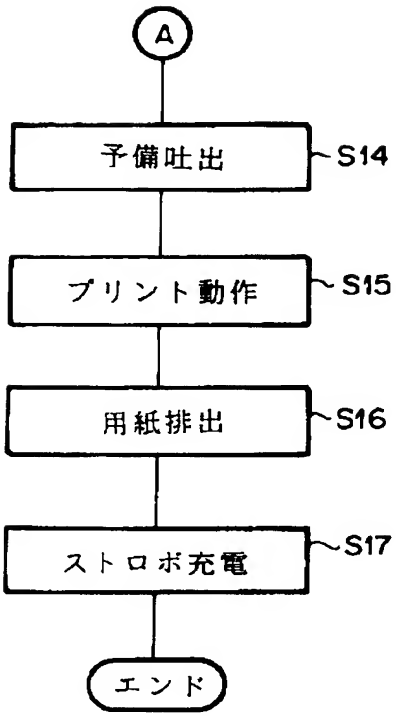
【図２】



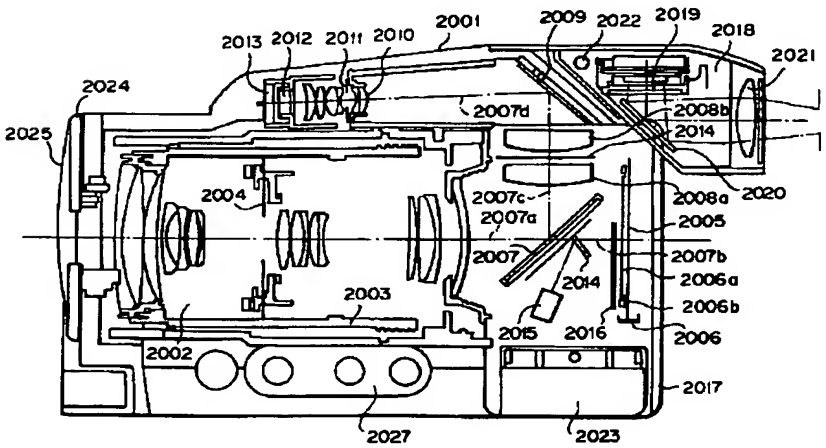
【図3】


11
ストロボ
発光部
3
カメラ部
5
撮像部
2
カメラ制御部
4
プリンタ
制御部
6
プリンタ
エンジン部
1
制御手段
メモリ部
10
SW1
SW2
PR
7
8
9

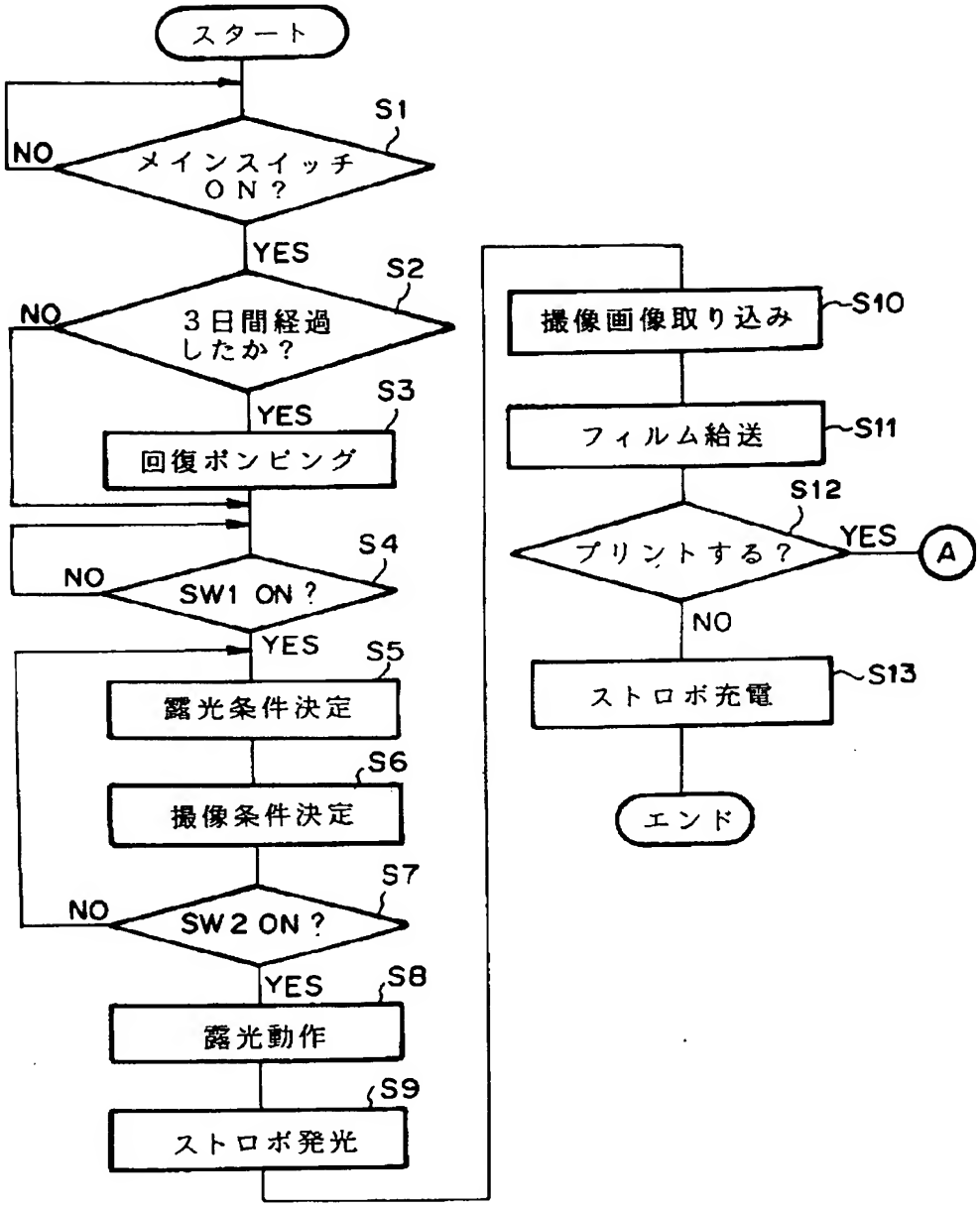
【図5】


A
予備吐出
S14
プリント動作
S15
用紙排出
S16
ストロボ充電
S17
エンド

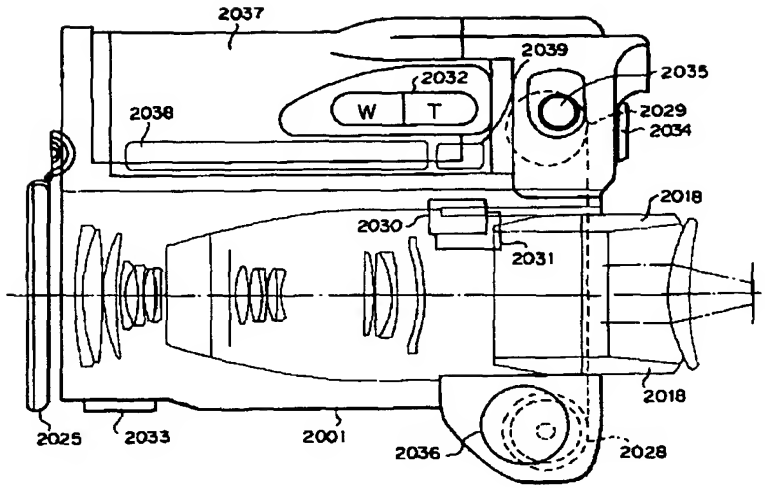
【図6】


2001
2009
2022
2019
2018
2021
2013
2012
2011
2010
2024
2025
2007d
2008b
2014
2004
2007c
2007a
2008a
2020
2005
2007
2007b
2014
2006a
2003
2006b
2015
2016
2006
2002
2017
2027
2023

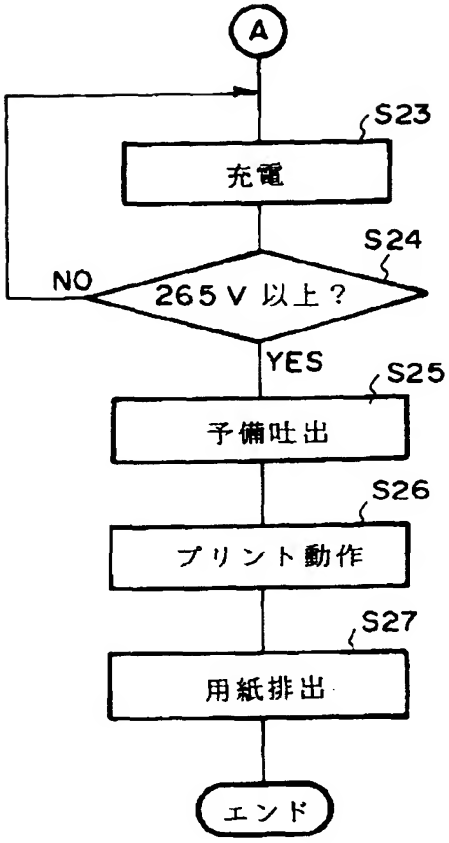
【図4】


スタート
S1
メインスイッチ ON？
NO
YES
S2
3日間経過 したか？
NO
YES
S3
回復ポンピング
S4
SW1 ON？
NO
YES
S5
露光条件決定
S6
撮像条件決定
S7
SW2 ON？
NO
YES
S8
露光動作
S9
ストロボ発光
S10
撮像画像取り込み
S11
フィルム給送
S12
プリントする？
YES
A
NO
S13
ストロボ充電
エンド

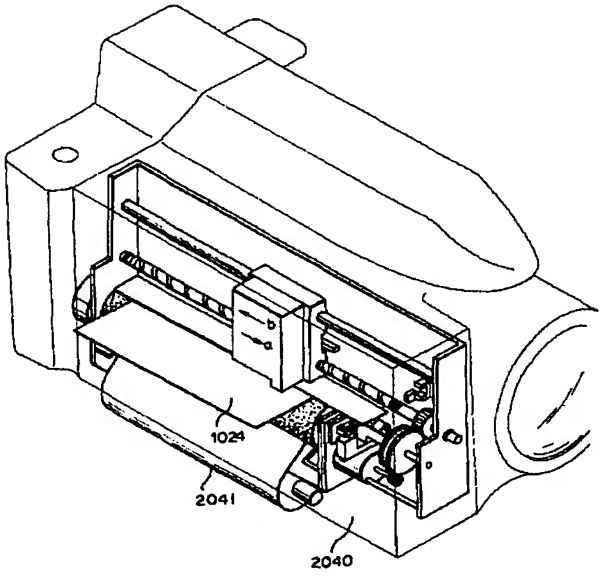
【図7】


2037
2039
2032
2035
2038
W
T
2029
2034
2018
2030
2031
2018
2025
2033
2001
2036
2028

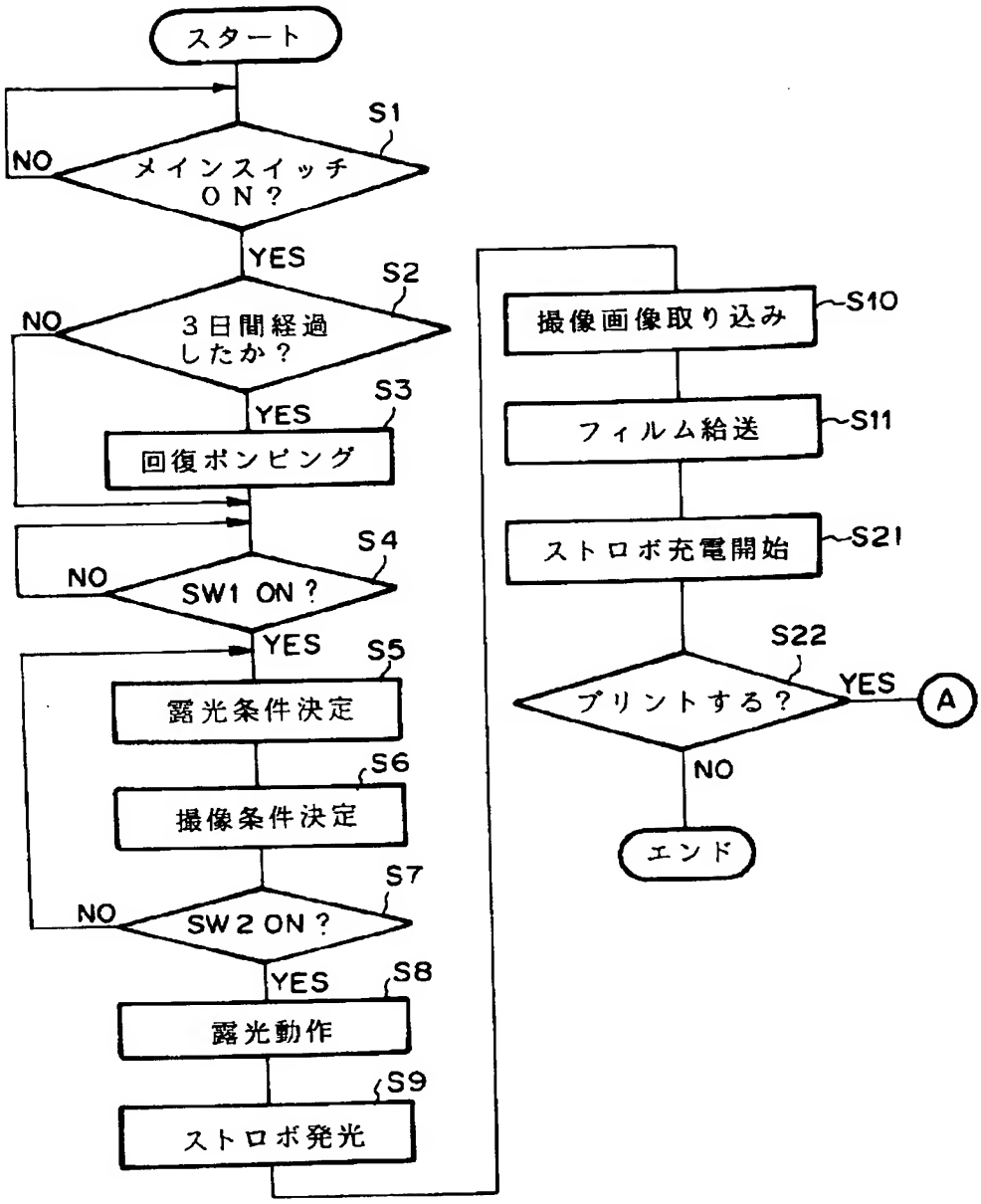
【図10】


A
S23
充電
S24
NO
265V 以上？
YES
S25
予備吐出
S26
プリント動作
S27
用紙排出
エンド

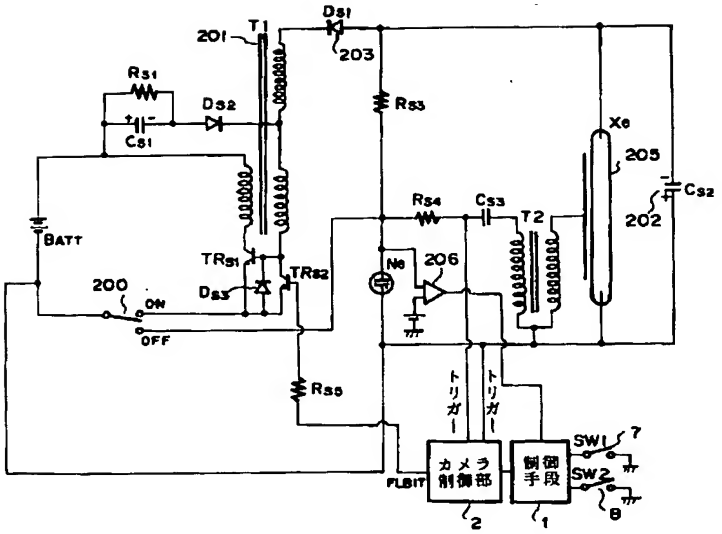
【図8】


b
a
1024
2041
2040

【図9】


スタート
S1
NO
メインスイッチ ON？
YES
S2
NO
3日間経過 したか？
YES
S3
回復ポンピング
S4
NO
SW1 ON？
YES
S5
露光条件決定
S6
撮像条件決定
S7
NO
SW2 ON？
YES
S8
露光動作
S9
ストロボ発光
撮像画像取り込み
S10
フィルム給送
S11
ストロボ充電開始
S21
S22
プリントする？
YES
A
NO
エンド

【図11】



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	5/91					